Tabular Synopsis

of the

Properties and Application

of the

Colours

of the

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FARBENFABRIKEN

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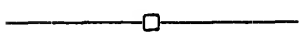
FRIEDRICH BAYER & Co.

Elberfeld

Third Edition

Part I



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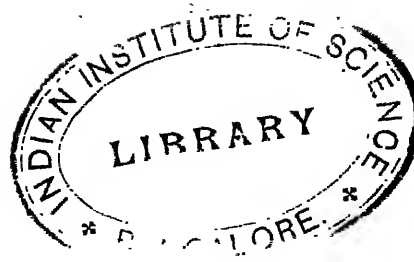

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Preface.

In publishing the third edition of our Tabular Synopsis, we have thought it advisable for practical reasons to treat the different branches of dyeing separately from those dealing with printing and hope that in this way we have rendered the book handier and more useful for reference.

In the new edition we have not confined our efforts merely to supplementing the earlier issues, but have endeavoured to improve and amplify the work in every direction.

We therefore hope that our esteemed friends will give this first part of our Tabular Synopsis a favourable reception.

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Contents.

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The dyeing of cotton.

Directions for dyeing Benzo colours.

On the whole, no difficulty is met with in dissolving the Benzo colours; water as soft as possible is employed for the process, best of all condensed water. If such water is not handy, it is advisable to previously correct the calcareous water with soda, in order to avoid the formation of insoluble lime salt. Hard water should also be softened for dyeing, by previously boiling with soda.

Common or Glauber's salt is employed to aid in the absorption of the colours. The price is generally the deciding factor which salt to use, as the figure demanded for this article varies in different countries. A certain amount of common salt has the same effect as a corresponding amount of calc. Glauber's salt.

1 part calc. Glauber's salt equals
$2^1/_5$ parts Glauber's salt cryst.

It should be taken into consideration that large quantities of lime and magnesia salts are frequently brought into the bath by using impure common salt, which at times act detrimentally on the goods.

Whilst salt assists, soda prolongs the absorption of the colour in by far the most cases. Therefore the percentage of salt should be decreased and that of soda increased for colours not easily soluble. Soda is liable to precipitate the colour when employed in too large quantities (above 10%).

1 part calc. soda corresponds to
$2^2/_5$ parts soda cryst.

The goods are usually entered at 85—100° Falht. when dyeing light shades; very pale shades are dyed best lukewarm, whilst for dark shades the bath is usually brought up to the boil, steam is then turned off and the goods allowed to feed for $^1/_2$—1 hour in the cooling down liquor. Dye as a rule for 1 hour in a volume of liquor of 15—20:1 of goods. The baths never exhaust completely so that when dyeing further lots in a standing bath, replenish with $^1/_4$—$^1/_5$ of the amount of Glauber's or common salt and

soda used for the first bath, and with $^2/_3$—$^3/_4$ of the percentage of dyestuff originally employed.

Recipe 1. Most Benzidine colours are dyed with a combination of Glauber's or common salt and soda. Employ, according to the desired depth of shade, 1—5% calc. soda and 5—40% Glauber's salt cryst.

Recipe 2. A large number of Benzidine colours are dyed best without soda. In such instances use 10—20% common salt or 20—45% Glauber's salt cryst. Brilliant Sky Blue G, and 5G should always be dyed without soda; it is advantageous for these colours, to add besides the Glauber's salt, 1—2% acetic acid,

Recipe 3. In some cases a strong alkaline liquor is necessary without any addition of salt. The dyeing is then carried out with 5—10% calc. soda.

Recipe 4. To increase the clearness of shade of certain colours employ a combination of 5—10% phosphate of soda and 2—5% soap in place of the Glauber's salt (or common salt) and soda.

Those colours in the following list of Benzo dyestuffs which are dyed according to recipe 3 or 4 have been marked with a corresponding figure in brackets; colours not so numbered are dyed according to recipe 1 and 2.

I. List of the direct dyeing Benzo Colours.

Red:
Benzo Bordeaux 6B
Benzo Fast Pink 2BL
Benzo Fast Red 9BL, FC, GL, L
Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS.
Benzo Purpurine 1B, 4B, 4B conc. 6B, 10B
Benzo Rhoduline Red B, 3B
Benzo Red 10B, 12B, SG
Brilliant Congo R
Brilliant Geranine B
Brilliant Purpurine R
Chloramine Red 8BS
Congo Corinth B, G
Congo Red
Congo Rubine
Delta Purpurine 5B
Geranine G
Hessian Purple N
Rose Azurine B, G

Orange:
Benzo Fast Orange S
Benzo Orange R

Chloramine Orange G
Congo Orange G, R, RG
Orange TA
Pluto Orange G
Toluylene Orange G, R

Yellow: (4) Benzo Fast Yellow 5GL
Chloramine Yellow C, FF, GG, HW, M, RC, W extra
(4) Chrysamine G, R
Chrysophenine G, GL extra, R
Direct Yellow R, R extra
Yellow PR, superfine (Primuline)
Thiazole Yellow G, 3G, GL, R

Green: Benzo Dark Green B, GG
Benzo Green BB, C, G
Benzo Olive
Brilliant Benzo Green B

Blue: Azo Blue
Benzo Azurine G, 3G, R, 3R
Benzo Blue 2B, 3B, BX, 2R, 4R, RW
Benzo Chrome Black N
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue B, BN, G, R, 5R
(3) Benzo Indigo Blue
Benzo Copper Blue B, 2B
(3) Benzo Navy Blue B
Benzo Sky Blue, conc., 4B
Benzo Red Blue G
Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G, R, 2R, 5R
Brilliant Benzo Blue 6B
Brilliant Fast Blue B, 2G
(2) Brilliant Sky Blue G, 5G
Chicago Blue B, R
Congo Blue 2B
Diazo Blue Black
Diazo Black B, 3B, BHN, BHN extra, R, R extra

Violet: Azo Violet
Benzo Fast Violet R
Benzo Violet R, RL extra
Brilliant Benzo Violet B, 2R
Chloramine Violet R
Heliotrope BB

Brown: Benzo Brown B, BR, BX, D3G extra, G, GG, 3GC, MC, NB, NBR, NBX, R extra, RC, 5R

Benzo Chrome Brown B, BS, CR, G, 5G, R, 3R
Benzo Dark Brown extra
Chloramine Brown G
Diazo Brown G
Direct Bronze Brown
Direct Fast Brown B, GG
Pluto Brown GG, NB, R
Toluylene Brown B, M

Grey: Benzo Chrome Black N
Benzo Fast Black L
Diazo Black BHN
Pluto Black CR, G, SS extra

Black: Benzo Chrome Black B, N
Benzo Fast Black L
Diazo Black 2B
Direct Blue Black B, N
Direct Black VT (halfwool)
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra
Pluto Black A, A extra, 3B extra, BS extra, CF extra, CR, F extra, F extra conc., FR, G, SS extra, TG extra, TG extra conc.

Diazotising.

Certain properties, such as fastness to washing and cross-dyeing, of a number of Benzo colours are considerably improved by subsequently diazotising and developing the shade.

Enter the well-rinsed dyeings in the diazotising bath which is prepared in the following manner:

For 10 lbs. goods	light or medium shades	dark shades (about 5 % dyestuff)
Sodium nitrite	$2^2/_3$ oz.	4— $4^1/_2$ oz.
Hydrochloric acid 32° Tw.	9 ,,	10—$13^1/_2$,,
or Sulphuric acid 142° Tw.	$5^1/_3$,,	7— $8^1/_2$,,

Dissolve the sodium nitrite in a little water, add the solution to the cold bath, and afterwards the acid. Then enter the goods and work cold for 15—20 minutes. Prolong the duration of the treatment to $^1/_2$ hour when working with colours that do not diazotise readily, for instance: Diazo Brilliant Black. Run off the liquor, rinse once in cold water (or hydroextract) then enter into the developing bath at once.

The diazotising process is carried out as a rule in wooden becks, should it be done in machines, however,

the quantities of sodium nitrite and acid must be decreased to correspond with the greater concentration of the bath. The diazotised shades should not be left lying for a long time before being developed, neither should they be handled in the direct sunlight, as the Diazo compounds formed on the fibre are easily decomposed thereby. Therefore develop immediately after diazotising.

If the diazotising bath is used for further lots, it is sufficient to add to the standing liquor $^1/_2$—$^1/_3$ of the above mentioned amounts of sodium nitrite and acid. Before entering the goods in the bath, however it should be ascertained by the smell, or by dipping a piece of iodine of potassium starch paper in the liquor, whether a sufficient quantity of nitrous acid is present; if the paper does not turn blue, the liquor is either wanting in sodium nitrite or acid. An additional amount can be subsequently added at any time.

The developing bath. The following maximum amounts of Developer for 10 lbs. cotton are calculated for a bottom shade of 4—5% per 20 gallons liquor:

Developer	A	B	F	G	H	I	soda
	$2^1/_2$	2	3	3	$2^1/_2$	2	$3^1/_2$ oz.

If Beta Naphtol is employed in place of developer A, take for every 1 lb. Beta Naphtol $4^1/_2$ oz caustic soda solid or $13^1/_2$ oz caustic soda 76° Tw. If Resorcine is used instead of Dev. F, calculate for $12^1/_2$ oz Resorcine 1 lb 9 oz caustic soda 76° Tw.

When dissolving Developer B add hydrochloric acid in drops until the milky colour of the solution has completely disappeared.

Developer H dissolves best with an addition of soda, say, $^1/_3$ of the weight of the developer.

Developer I is dissolved with an addition of 1 to $1^1/_5$ litre soda lye 75° Tw (per 2 lbs. Developer).

The soda bath is, contrary to the ordinary developing baths, worked near the boil.

Dissolve the Developer and add the solution to the cold bath, work the cotton in same for 15—20 minutes cold, then rinse or hydroextract. When developing with soda, the bath should be hot. An addition of soda is advantageous when employig Dev. H in order to neutralize any acid which may still be present in the goods from the sodium nitrite bath.

Rinse well after developing, in order to remove any Toluylene Diamine or Phenylene Diamine which may possibly be on the fibre. Yarns for fancy woven articles, which are required to be very fast to washing, are in many in-

stances washed in a warm soap bath (5—10 grms. soap per gallon) after being developed.

Developers A, H&F are especially adapted for combining with one another. To arrive at a shade between those produced by Dev. A and Dev. H, it is necessary to use a much smaller amount of the latter, as Dev. H couples much quicker than Dev. A and therefore Dev. A would scarcely show up were equal parts of both Developers employed. The best proportion is $1^1/_2\,\%$ Dev. A to $^1/_5\,\%$ Dev. H, i. e. for 20 lbs cotton $5^1/_2$ oz Dev. A and $^3/_4$ oz Dev. H.

In some cases the developed shades may be after-treated with copper sulphate, in order to increase the fastness to light and washing. (See chapter 14, page 16.)

2. List of Diazotisable Colours

(D. = Developer.)

Red: Diazo Bordeaux, 7B (D. A)
Diazo Brilliant Scarlet B extra, 3B extra, 6B extra, 2BL extra conc., 5BL extra, G extra (D. A)
Diazo Rubine B (D. A)
Yellow PR, superfine (Primuline) (D. A) (D. B)

Orange: Diazo Brilliant Orange G
Yellow PR, superfine (Primuline) (D. F)

Yellow: Yellow PR, superfine (Primuline) (D. J) (soda)

Blue: Benzo Azurine 3R (D. A)
Diazo Blue, 3R (D. A)
Diazo Dark Blue 3B (D. A)
Diazo Fast Black B, 3B (D. A)
Diazo Indigo Blue BR extra, M, 3R, 2RL, 4RL (D. A)
Diazo Red Blue 3R (D. A)
Diazo Black BHN (D. A) (D. G)
Diazurine B (D. A)

Brown: Benzo Brown B, BR, MC, NB, NBR, R extra, RC (D. A) (D. H)
Diazo Brown G, R extra (D. A) (D. H)
Diazo Brown R extra (soda)
Diazo Brilliant Black B (soda)
Direct Fast Brown B (D. A) (D. H)

Black: Benzo Fast Black, L (D. A) (D. H)
Diazo Brilliant Black B (D. A) (D. B) (D. H)
Diazo Fast Black B (D. F) (D. H)
Diazo Fast Black BHX, SD (D. H) (D. A & F) (D. A & H)
Diazo Black B, 2B, 3B, BHN, BHN extra, G, H, R, R extra (D. A) (D. H)
Direct Deep Black brands (D. A) (D. H)

3. Benzo colours, the direct dyed shades of which are fairly fast to washing.

Red:	Benzo Fast Pink 2BL
	Benzo Fast Red 9BL (as a pink, good), FC, L
	Benzo Fast Scarlet GS
	Benzo Purpurine 1B, 4B, 4B conc., 6B
	Benzo Rhoduline Red B, 3B (as a pink, good)
	Benzo Red 12B
	Brilliant Purpurine R
	Congo Red
	Delta Purpurine 5B
Orange:	Chloramine Orange G
Yellow:	Benzo Fast Yellow 5GL
	Chloramine Yellow C, FF, GG, HW, RC
	Direct Yellow R, R extra
	Thiazole Yellow G, 3G, GL, R
Blue:	Benzo Chrome Black N
	Benzo Chrome Black Blue B
	Benzo Fast Blue B
	Benzo Indigo Blue
	Benzo Black Blue G, 5G, R
	Benzo Navy Blue B
	Benzo Sky Blue
	Brilliant Azurine R (in light shades)
	Brilliant Benzo Blue 6B
	Brilliant Fast Blue B, 2G (in light shades)
Violet:	Benzo Fast Violet R (in light shades)
	Brilliant Benzo Violet B, 2R (in light shades)
Brown:	Benzo Brown 3GC (in light shades), MC, 5R
	Benzo Chrome Brown brands
	Diazo Brown G
	Toluylene Brown B, M
Black:	Pluto Black G

4. Benzo colours, which are rendered faster to washing by an after-treatment with bichrome or fluoride of chrome.

Treat the well-rinsed shades for $^1/_2$ hour at the boil with 2—3% bichrome or chromate of soda or with 2—4% fluoride of chrome, with an addition of a little acetic acid if necessary, then rinse and dry.

Red:	Benzo Fast Red FC (fluoride of chrome)
Yellow:	Chloramine Yellow C, FF, HW, RC (bichrome)
	Chrysamine G, R (fluoride of chrome, bichrome)
Green:	Benzo Dark Green B, GG (fluoride of chrome)
	Benzo Green BB, G (fluoride of chrome)
	Brilliant Benzo Green B (fluoride of chrome)

Blue: Benzo Chrome Black Blue B (bichrome)
Benzo Indigo Blue (bichrome)
Brown: Benzo Brown MC (fluoride of chrome)
Pluto Orange G (bichrome)
Toluylene Brown B (fluoride of chrome)
Toluylene Orange G (bichrome)
Black: Benzo Chrome Black B, N, Benzo Chrome Black Blue B, Direct Blue Black B, N } (bichrome)
Direct Deep Black E extra, EW extra, RW extra
Pluto Black CR, G } (bichrome)

5. Benzo colours, which are rendered faster to light and washing by an after-treatment with bichrome and copper sulphate.

Treat the well rinsed shades in a fresh, boiling bath for 20—30 minutes with the addition of 2—3% bichrome and 2—3% copper sulphate, also add acetic or sulphuric acid to the bath until the turbidness arising at the commencement has disappeared.

Red: Benzo Fast Red FC
Benzo Red 12B
Yellow: Chloramine Yellow HW
Chrysamine G, R
Green: Benzo Olive
Blue: Benzo Azurine G
Benzo Chrome Black Blue B
Benzo Indigo Blue
Benzo Copper Blue B, 2B
Brilliant Azurine R
Brown: Benzo Brown MC, 3GC
Benzo Chrome Brown brands
Diazo Brown R extra
Direct Deep Black brands
Pluto Orange G
Pluto Black SS extra
Toluylene Brown B (faster to washing only)
Toluylene Orange G
Grey & Black: Benzo Chrome Black B, N
Benzo Chrome Black Blue B

6. Benzo colours, which are rendered faster to washing by an after-treatment with Formaldehyde.

Treat the shades in a cold bath for $^1/_2$ hour with $^1/_2$ to 2% technical Formaldehyde, or for 15—20 minutes at 140° Faht.

Green: Benzo Olive
Blue: Diazo Black BHN
Brown: Benzo Brown MC
Pluto Brown NB, R
Black: Direct Deep Black brands
Pluto Black brands
(For shading:
Direct Yellow R
Pluto Orange G)

7. Benzo colours, which are rendered faster to washing by an after-treatment with diazotised Paranitraniline.

Treat the rinsed, or hydroextracted shades for $^1/_2$ hour cold in the coupling bath prepared from Paranitraniline as follows: Mix 2 lbs Paranitraniline with 5 lbs Hydrochloric acid 35° Tw. and dissolve same by boiling in about 1 gallon hot water. An addition of concentrated hydrochloric acid dissolves the Paranitraniline at the commencement, but it soon precipitates again in the form of a crystalline pulp. After about $^1/_2$ hour add $7^1/_2$ gallons cold water and then pour in while constantly stirring, the whole of a solution of 1 lb. nitrite and $^3/_4$ gallon water. After standing for $^1/_2$ hour the liquor is clear except for small quantities of impurities floating on the surface. These should be removed by straining the diazo-solution into the coupling bath through a piece of cotton placed over a sieve. The bath is then made up with the necessary amount of water for working. Shortly before entering the bottom-dyed goods, add to the bath 2 lbs. acetate of soda and 1 lb. soda ash. Work the bottom-dyed goods for $^1/_2$ hour in the cold developing bath, then rinse well and soap if necessary. For 100 lbs. of goods take:

	for light & dark shades.
Paranitraniline	$^3/_4$ lb. — 1 lb.
Hydrochloric acid 35°	2 lb. — $2^1/_2$ lb.
Nitrite	$6^1/_2$ oz. — 9 oz.
Acetate of soda cryst.	$^3/_4$ lb. — 1 lb.
Soda ash	6 oz. — $^1/_2$ lb.

When requiring large quantities of diazotised Paranitraniline solution, it is best to employ petroleum casks having a capacity of 45—55 gallons and provided with a wooden tap near the bottom of the cask. In such a cask a sufficient quantity of Diazo-solution can be prepared for treating about 4 batches of goods each weighing about 2 cwts. Work according to the proportions mentioned above and make up with water to 45—55 gallons. For each batch

of 2 cwts. draw off $12\frac{1}{2}$ or 15 gallons of the solution; the wooden buckets of 3 gallons capacity, which are extensively used in dyehouses, are very well adapted for this purpose. The impurities formed in making the solution soon rise to the surface, so that only the clear liquid runs through the tap. Store the casks in a cool place and take care that the temperature of the liquid when diazotising does not rise above 60° Faht. before adding the nitrite, if necessary cool down with ice to 60—50° Faht. Ice, however, will be seldom required even in summer, especially when the treatment can be carried out with spring water.

Red:	Benzo Nitrol Bordeaux G
Yellow:	Yellow PR, superfine (Primuline)
	Thiazole Yellow 3G
Green:	Chicago Blue B, R
	Para Green B, G
Blue:	Para Blue G, R
Brown:	Benzo Brown G, R extra
	Benzo Nitrol Brown G, 2R
	Diazo Brown G
	Direct Fast Brown B
	Pluto. Brown GG, NB, R
	Pluto Orange G
	Toluylene Brown B, M
	Toluylene Orange G, R
Black:	Benzo Nitrol Black B, T
	Direct Blue Black B
	Direct Deep Black brands.

8. Benzo colours, which, without being coupled with diazotised Paranitraniline, are employed as shading colours for the above mentioned dyestuffs.

Red:	Benzo Fast Red FC (duller)
Orange:	Chloramine Orange G
Yellow:	Chloramine Yellow C, FF, GG, HW, RC, W extra
	Direct Yellow R, R extra
Blue:	Benzo Chrome Black Blue B

9. Benzo colours, which are rendered faster to finishing (sizing and mangling) when after-treated with sulphate of alumina.

Dissolve 1 lb. sulphate of alumina with 1 lb. acetate of soda each in 6 gallons hot water. When cold pour the solutions together and fill up with water to 22 gallons.

e solution is not stable, and in course of time it becomes
ky, precipitating as basic-sulphate of alumina. Place the
ton to be dyed with Benzo colours for 1 hour in the
ve liquor, turn every 10 minutes if necessary, hydro-
ract and dry.

ed:	Benzo Fast Pink 2BL
	Benzo Fast Red FC, GL, L
	Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
	Benzo Purpurine 1B
	Benzo Rhoduline Red B, 3B
	Benzo Red SG, 10B
	Brilliant Congo R
	Brilliant Purpurine R
	Congo Corinth B
	Delta Purpurine 5B
	Hessian Purple N
	Rose Azurine B, G
range:	Benzo Fast Orange S
	Chloramine Orange G
	Congo Orange G, RG
	Pluto Orange G
	Toluylene Orange G
ellow:	Chloramine Yellow C, FF, GG, HW, RC
	Chrysamine G, R
	Direct Yellow R, R extra
	Yellow PR, superfine (Primuline)
	Thiazole Yellow G, R
reen:	Benzo Dark Green B, GG
	Benzo Green BB, G
	Benzo Olive
	Brilliant Benzo Green B
lue:	Azo Blue
	Benzo Azurine G, 3G, R
	Benzo Blue RW
	Benzo Chrome Black Blue B
	Benzo Cyanine B, R
	Benzo Fast Blue BN, G
	Benzo Indigo Blue
	Benzo Copper Blue B, 2B
	Benzo Navy Blue B
	Benzo Black Blue G, 5G, R
	Brilliant Azurine B, 5G, R, 2R, 5R
	Brilliant Benzo Blue 6B
	Brilliant Fast Blue B, 2G
	Brilliant Sky Blue G, 5G
	Chicago Blue B, R
	Congo Blue 2B

Diazo Dark Blue 3B (dev. A)
Diazo Indigo Blue BR extra, M, 2RL, 4RL (dev. A)

Violet: Azo Violet
Benzo Fast Violet R
Benzo Violet R
Chloramine Violet R

Brown: Benzo Brown D3C, extra, RC
Benzo Chrome Brown B, BS, CR, G, 5G, R, 3R
Direct Fast Brown B
Pluto Brown GG, NB, R
Toluylene Brown B, M

Grey & Black: Benzo Chrome Black B, N
Benzo Fast Black L
Direct Blue Black B, N
Pluto Black A, A extra, 3B extra, BS extra, CR, F extra, FR, G

10. Benzo colours, which, on account of their good solubility, can be employed for dyeing in machines.

(Those which are particularly easily soluble are marked with an asterisk.)

Red: Benzo Bordeaux 6B
*Benzo Fast Red 9BL, FC
Benzo Fast Scarlet 4BA*, 8BA*, 4BS, 5BS*, GS, 7BS
Benzo Purpurine 1B*, 4B, 4B conc.*, 6B, 10B
*Benzo Rhoduline Red B (as pink)
Benzo Red 10B, 12B, SG*
*Brilliant Congo R
*Brilliant Geranine B
Brilliant Purpurine R
Congo Rubine
Delta Purpurine 5B
*Diazo Bordeaux, 7B (D. A.)
Diazo Brilliant Scarlet B extra, 3B extra, 6B extra, 2BL extra conc.*, 5BL extra*, G extra (D. A)
Hessian Purple N
*Yellow PR, superfine (Primuline) (Dev. A)

Orange: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G*, RG
Diazo Brilliant Orange G (D. A)
Orange TA
*Pluto Orange G

	*Yellow PR. superfine (Primuline) (Dev. F)
Yellow:	Chloramine Yellow C, FF, GG, HW, M, RC, W extra
	Chrysophenine G, GL extra, R
	*Direct Yellow R, R extra
	*Yellow PR, superfine (Primuline) (Dev. J)
	Thiazole Yellow G*, 3G*, GL*, R
Green:	Benzo Dark Green B*, GG
	Benzo Green BB, C, G
	Benzo Olive
	Brilliant Benzo Green B
Blue:	*Benzo Blue 2B, 3B, 2R, 4R
	*Benzo Chrome Black Blue B
	Benzo Cyanine 3B
	Benzo Fast Blue G, R, 5R
	Benzo Copper Blue B, 2B
	Benzo Sky Blue, conc.
	Benzo Red Blue G
	Benzo Black Blue G, 5G
	Brilliant Azurine B*, R, 2R, 5R
	Brilliant Benzo Blue 6B
	Brilliant Fast Blue B, 2G
	Brilliant Sky Blue G, 5G
	Diazo Blue Black
	Diazo Indigo Blue M, 2RL, 4RL (Dev. A)
	Diazo Red Blue 3R (Dev. A)
	Diazo Black B, BHN, BHN extra, R, R extra
	Diazurine B
Violet:	*Benzo Fast Violet R
	*Benzo Violet R, RL extra
	Brilliant Benzo Violet B, 2R
	*Chloramine Violet R
	*Heliotrope BB
Brown:	Benzo Brown B, BR, BX, GG, 3GC, NB, NBR, NBX, R extra, RC, 5R
	Benzo Chrome Brown B*, G, 5G, R, 3R*
	*Benzo Dark Brown extra
	Diazo Brilliant Black B (soda)
	Diazo Brown R extra (soda)
	Direct Fast Brown B, GG
	Pluto Brown GG, NB. R
	Toluylene Brown B, M
Grey:	Benzo Fast Black L*
	Diazo Blue Black
Black:	Benzo Chrome Black B, N (Chrome and copper)
	Benzo Fast Black
	Diazo Brilliant Black B (Dev. A) (Dev. B)

Diazo Black B, 2B, BHN, BHN extra, G, H, R, R extra (Dev. A) (Dev. H)
*Direct Deep Black brands.
Pluto Black A extra, 3B extra, CR, F extra, G.

11. Benzo colours, which on account of their excellent level dyeing property are particularly adapted for the production of light combination shades.

Red: Benzo Fast Red 9BL, GL
Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
Benzo Purpurine 4B, 4B extra, 6B, 10B
Benzo Rhoduline Red B, 3B
Orange: Benzo Fast Orange S
Congo Orange G, R, RG
Pluto Orange G
Yellow: Chloramine Yellow FF, RC, W extra
Chrysophenine G, R
Thiazole Yellow GL
Green: Benzo Dark Green B, GG
Benzo Green BB, C, G
Blue: Benzo Azurine G, 3G, R
Benzo Chrome Black Blue B
Benzo Sky Blue
Benzo Black Blue 5G
Brilliant Azurine R
Brilliant Fast Blue B, 2G
Diazo Black BHN, R extra
Violet: Benzo Violet R, RL extra
Brilliant Benzo Violet B, 2R
Brown: Pluto Brown GG, NB, R
Grey & Black: Benzo Fast Black L
Pluto Black BS extra, SS extra

12. Benzo colours which can be dyed cold or luke-warm.

Red: Benzo Bordeaux 6B
Benzo Fast Red GL
Benzo Purpurine 10B
Benzo Rhoduline Red B
Benzo Red 12B, SG
Brilliant Geranine B
Brilliant Purpurine R
Congo Red
Congo Rubine
Geranine G

Orange:	Chloramine Orange G
Yellow:	Chloramine Yellow GG, HW, M, W extra
	Chrysophenine G, GL extra, R
	Direct Yellow R, R extra
	Thiazole Yellow 3G, GL
Blue:	Benzo Blue 2B, 3B
	Benzo Cyanine 3B
	Benzo Sky Blue, 4B
	Benzo Red Blue G
	Brilliant Benzo Blue 6B
	Diazo Black BHN
Violet:	Benzo Violet R, RL extra
	Brilliant Benzo Violet B, 2R
	Heliotrope BB
Brown:	Benzo Brown 5R
	Toluylene Brown M
Black:	Benzo Fast Black, L
	Direct Black VT
	Pluto Black BS extra, F extra
	Pluto Milling Black B

13. Benzo colours which are particularly remarkable for their good fastness to light.

a) Direct dyed shades.

Red:	Benzo Fast Pink 2BL
	Benzo Fast Red 9BL, FC, GL, L
	Brilliant Geranine B
	Geranine G
Orange:	Benzo Fast Orange S
	Chloramine Orange G
	Congo Orange RG
	Pluto Orange G
	Toluylene Orange G
Yellow:	Benzo Fast Yellow 5GL
	Chloramine Yellow C, FF, HW, M, RC, W extra
	Chrysamine G, R
	Chrysophenine G, GL extra, R
Green:	Brilliant Benzo Green B
Blue:	Benzo Fast Blue B, BN, G, R
	Benzo Indigo Blue
	Benzo Navy Blue B
	Benzo Black Blue G, 5G, R
	Brilliant Azurine 5G
	Brilliant Fast Blue B, 2G
Violet:	Benzo Fast Violet R
	Benzo Fast Violet RL extra

Brown: Benzo Brown MC
Benzo Chrome Brown G, 3R
Chloramine Brown G
Grey & Black: Pluto Black CR, G, SS extra

b) Diazotised shades.

Diazo Indigo Blue BR extra, M, 2RL, 4RL, (D. A)
Diazo Brown G (D. H)
Diazo Fast Black B, 3B, SD (D. H)

c) Shades which are rendered faster to light by a simultaneous treatment with copper and chrome. (See paragraph 5, page 8.)

d) Colours produced on the fibre.

Aniline Black
Benzidine Puce
Dianisidine Blue
Naphtylamine Claret
Paranitraniline Red

14. Benzo colours, which are rendered faster to light by an aftertreatment with copper sulphate.

Treat the shades for 15—20 minutes at a temperature of 120—140° Faht. with the addition of 1—3% copper sulphate and a little acetic acid.

Red: Benzo Red 12B (bluer)
Yellow: Chrysamine G, R
Blue: Benzo Azurine G, 3G, R
Benzo Blue RW
Benzo Cyanine 3B
Benzo Indigo Blue
Benzo Copper Blue B, 2B
Benzo Sky Blue
Brilliant Azurine 5G, R, 2R
Brilliant Benzo Blue 6B
Blue: Diazo Blue, 3R
Diazo Dark Blue 3B
Diazo Indigo Blue BR extra, M, 3R } (D. A)
Diazo Fast Black B, 3B, G
Diazo Black 3B
Violet: Azo Violet
Brilliant Benzo Violet B, 2R (turn bluer by the aftertreatment.)
Chloramine Violet R
Brown: Benzo Brown 3GC, MC
Pluto Orange G
Black: Pluto Black SS extra (more violet)

15. Benzo colours, which are fast to ammonia 20 %.

All Benzo colours are fast to ammonia with the exception of the following:

Red:	Benzo Bordeaux 6B
	Benzo Red SG
	Congo Corinth B, G
Orange:	Orange TA
Yellow:	Chrysamine G, R
	Thiazole Yellow G, R
Green:	Benzo Green C
	Benzo Olive
	Brilliant Benzo Green B
Blue:	Azo Blue
	Benzo Azurine brands
	Benzo Blue BX
	Benzo Cyanine R
	Benzo Indigo Blue
	Benzo Copper Blue B, 2B
	Brilliant Azurine B, 5G, R
	Brilliant Fast Blue B
	Brilliant Sky Blue G, 5G
	Benzo Black Blue R
	Congo Blue 2B
Violet:	Azo Violet
	Benzo Violet R
	Heliotrope BB
Brown:	Benzo Brown BX, NB, NBR, NBX
	Benzo Chrome Brown G, 5G, 3R
	Toluylene Brown M
Black:	Benzo Chrome Black B, N
	Direct Blue Black N

16. Benzo colours, which are fast to acetic acid 9° Tw.

All Benzo colours are fast to acetic acid excepting the following:

Red:	Benzo Purpurine 4B, 4B conc., 6B, 10B
	Benzo Red 10B
	Brilliant Purpurine R
	Congo Corinth B, G
	Congo Red
	Congo Rubine
Orange:	Benzo Orange R
	Orange TA
Yellow:	Chrysamine G, R
	Thiazole Yellow brands
Blue:	Brilliant Azurine 2R, 5R

Brown: Benzo Brown MC, NB, R extra, RC
Benzo Chrome Brown B, CR, G, R, 3R
Black: Direct Black VT
Direct Deep Black brands

17. Benzo colours, which are fast to cold sulphuric acid 10%.

Red: Benzo Bordeaux 6B
Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
Benzo Rhoduline Red B
Benzo Red SG
Brilliant Geranine B
Chloramine Red 8BS
Geranine G
Orange: Benzo Fast Orange S
Chloramine Orange G
Congo Orange RG
Pluto Orange G
Yellow: Chloramine Yellow C, FF, GG, HW, RC
Direct Yellow R, R extra
Green: Benzo Olive
Blue: Azo Blue
Benzo Azurine G, 3G, R
Benzo Blue brands
Benzo Chrome Black B, N
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B, R
Benzo Fast Blue B, BN
Benzo Indigo Blue
Benzo Copper Blue B, 2B
Benzo Navy Blue B
Benzo Sky Blue, conc.
Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G, R
Brilliant Benzo Blue 6B
Brilliant Fast Blue 2G
Brilliant Sky Blue G, 5G
Chicago Blue B
Congo Blue 2B
Diazo Blue Black
Diazo Black B. 3B
Violet: Benzo Violet R, RL extra
Heliotrope BB
Brown: Benzo Brown B, D3G extra, 3GC, 5R
Benzo Chrome Brown 5G
Diazo Brown G

Brown: Direct Fast Brown B, GG
Pluto Brown GG, NB, R
Black: Benzo Chrome Black B, N
Diazo Black 2B
Pluto Black brands

18. Benzo colours fast to cross-dyeing.

These colours also stand mordanting with bichrome, t the shades of Diazo Brilliant Scarlet, Diazo Brilliant ange G, and Yellow PR (Primuline) are slightly flattened ereby.

Red: Benzo Nitrole Bordeaux G (Paranitr.)
Diazo Bordeaux, 7B (D. A)
Diazo Brillant Scarlet brands (D. A)
Diazo Rubine B (D. A)
Yellow PR. superfine (Primuline) (D. A)
Orange: Diazo Brilliant Orange G (D. A)
Yellow PR, superfine (Primuline) (D. F)
Yellow: YellowPR. superfine(Primuline)(D.J)(Paranitr.)
Green: Chicago Blue B, R (Paranitr.)
Blue: Diazo Indigo Blue BR extra. 3R (D. A)
Brown: Benzo Chrome Brown B, CR, G, 5G, R, 3R (cr. cu.)
Benzo Nitrole Brown G, 2R (Paranitr.)
Diazo Brown G, R extra (D. H) (R extra also soda)
Direct Fast Brown B (D. H)
Pluto Brown R
Pluto Orange G
Toluylene Brown B, M } (Paranitr.)
Toluylene Orange G, R
Black: Benzo Chrome Black B, N (cr. cu.) Aniline Salt)
Benzo Chrome Black Blue B (cr. cu.) Aniline Salt
Diazo Brilliant Black B (D. A) (D. B) (D. H)
Diazo Fast Black B, 3B, BHX, BZ, G. SD (D. H)
Diazo Black BHN, R extra (D. H)

19. Benzo colours, which withstand a solution of chloride of lime $^{3}/_{4}{}^{0}$ Tw.

hose marked with an asterisk are still faster to chlorine)

Red: Benzo Fast Red GL, L
Benzo Rhoduline Red B, 3B (moderate)
Benzo Red 12B (moderate)
Brilliant Geranine B

Red: Chloramine Red 8BS
Diazo Bordeaux (D. A)
Geranine G (moderate)
Yellow PR, superfine (Primuline) (D. A)
Orange: *Chloramine Orange G
Congo Orange G, R
Yellow: *Chloramine Yellow C, FF, GG, HW, M, RC, W extra
*Chrysophenine G, GL extra, R
*Direct Yellow R, R extra
*Yellow PR, superfine (Primuline) (Chloride of lime)
Thiazole Yellow 3G
Violet: Chloramine Violet R
Brown: Chloramine Brown G

20. Benzo colours, which alter but slightly or not at all when ironed dry.

Red: Benzo Fast Pink 2BL
Benzo Fast Red 9BL, FC, GL, L
Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
Benzo Nitrole Bordeaux G (Paranitr.)
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Red 10B, SG
Brilliant Congo R
Brilliant Geranine B
Brilliant Purpurine R
Chloramine Red 8BS
Congo Red
Congo Rubine
Delta Purpurine 5B
Diazo Bordeaux, 7B
Diazo Brilliant Scarlet brands } (D. A)
Diazo Rubine B
Geranine G
Yellow PR, superfine (Primuline) (D. A) D. B)
Rose Azurine B, G
Orange: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R, RG
Diazo Brilliant Orange G
Orange TA
Pluto Orange G
Yellow PR (Primuline) (D. F.)
Toluylene Orange R (Paranitr.)

Yellow:	Benzo Fast Yellow 5GL
Yellow:	Chloramine Yellow C, FF, GG, HW, M, RC, W extra
	Chrysamine G, R
	Chrysophenine G, GL extra, R
	Direct Yellow R, R extra
	Thiazole Yellow 3G, GL, R
	Yellow PR, superfine (Primuline) (D. J)
Green:	Benzo Dark Green B, GG
	Benzo Green BB, C, G
	Benzo Olive
	Brilliant Benzo Green B
	Chicago Blue B (Paranitr.)
Blue:	Benzo Blue 2B, 3B, BX, 2R, 4R, RW
	Benzo Chrome Black Blue B
	Benzo Cyanine B, 3B, R
	Benzo Fast Blue B, BN, G, R
	Benzo Indigo Blue
	Benzo Copper Blue B, 2B (cr. cu.)
	Benzo Navy Blue B
	Benzo Sky Blue, conc., 4B
	Benzo Red Blue G
	Benzo Black Blue 5G
	Brilliant Azurine R
	Brilliant Benzo Blue 6B
	Brilliant Fast Blue B, 2G
	Brilliant Sky Blue G, 5G
	Chicago Blue B, R
	Diazo Blue, 3R (D. A)
	Diazo Blue Black
	Diazo Dark Blue 3B (D. A direct or cu.)
	Diazo Indigo Blue brands (D. A)
	Diazo Red Blue 3R (D. A)
	Diazo Black B, BHN, R extra
	Diazurine B (D. A.)
Violet:	Chloramine Violet R
Brown:	Benzo Brown BR, D3G extra, G, GG, 3GC, MC, R extra, 5R
	Benzo Chrome Brown B, BS, CR, 5G, R, 3R
	Benzo Nitrole Brown G, 2R
	Chloramine Brown G
	Diazo Brown G
	Direct Fast Brown B, GG
	Pluto Brown brands
	Toluylene Brown B, M
Grey:	Benzo Fast Black, L
	Pluto Black CR, G, SS extra

Black: Benzo Chrome Black B, N (cr. cu.)
Benzo Nitrole Black B, T (Paranitr.)

Black: Diazo Brilliant Black B (D. A) (D. B)
Diazo Fast Black B, 3B, G (D. H), BHX, BZ (D. A & H), SD (D. A & F)
Diazo Black B, 2B, 3B, BHN, G, H, R, R extra (D. A) (D. H)
Direct Blue Black B
Direct Deep Black brands
Pluto Black brands

21. Benzo colours, which tint the white but slightly (*) or not at all when ironed damp.

Red: *BenzoBordeaux 6B
*Benzo Fast Pink 2BL
Benzo Fast Red FC
Benzo Rhoduline Red B
Benzo Red SG
Brilliant Congo R
*Brilliant Geranine B (Pink)
*Brilliant Purpurine R
*Chloramine Red 8BS
Delta Purpurine 5B
Diazo Bordeaux, 7B
Diazo Brilliant Scarlet brands } (D. A)
Diazo Rubine B

Orange: *Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Congo Orange G, R, RG*
Pluto Orange G

Yellow: Chloramine Yellow C, FF*, GG, HW, M*, RC*, W extra*
Chrysamine G, R
*Chrysophenine G, R
Direct Yellow R, R extra
Thiazole Yellow 3G

Green: *Benzo Green BB, G
Benzo Olive
Brilliant Benzo Green B

Blue: Benzo Azurine 3R (D. A) (D. B)
*Benzo Blue 2B, 3B, 2R, 4R, RW
Benzo Chrome Black Blue B
*Benzo Cyanine B, 3B
*Benzo Fast Blue B, BN, G
Benzo Indigo Blue
Benzo Navy Blue B

Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G, R*, 2R, 5R

Blue: *Brilliant Benzo Blue 6B
*Chicago Blue B, R
*Congo Blue 2B

Violet: *Benzo Fast Violet R
Benzo Violet R

Brown: *Benzo Chrome Brown B, CR. G, 5G, 3R (direct)
Benzo Chrome Brown brands (cr. cu.)
*Direct Fast Brown B, GG
Pluto Brown GG, NB, R

Grey: Benzo Fast Black, L
Pluto Black CR

Black: Benzo Chrome Black B, N (cr. cu.)
Diazo Brilliant Black B (D. A) (D. B)
Diazo Fast Black B, BHX, BZ (D. A & H)
Diazo Fast Black SD (D. A & F)
Diazo Black brands (D. H)
Direct Blue Black B
Direct Deep Black brands
Pluto Black A, A extra, 3B extra, BS extra, CR, F extra, FR, G, SS extra, (direct and cr. cu.)

22. Benzo colours, which are fast to stoving.

All Benzo colours are fast to stoving excepting those mentioned below. Those marked with an asterisk alter more or less by stoving, but the original shades return when rinsed in water.

Red: *Benzo Purpurine 1B, 4B, 4B conc., 6B, 10B
*Benzo Rhoduline Red B, 3B
*Benzo Red 12B
*Brilliant Congo R
*Congo Red
Congo Rubine
*Delta Purpurine 5B
*Hessian Purple N
*Rose Azurine G

Orange: *Benzo Orange R
*Orange TA
*Toluylene Orange R

Yellow: Thiazole Yellow GL

Blue: Brilliant Fast Blue B
Brilliant Sky Blue G, 5G

Brown: Benzo Brown B, BX, G, GG, 3GC, NB, NBR, NBX, R extra
*Direct Bronze Brown

23. Benzo colours used for bottoming Aniline Black.

Work in a long liquor with 4% bichrome, 2% copper sulphate, 3% Aniline salt, and 3% sulphuric acid, first cold for 1/4 hour, then at 120—140° Faht. for 1 hour.

Red:	Congo Red
Green:	Benzo Dark Green B
Blue:	Benzo Blue BX
	Benzo Chrome Black Blue B
	Benzo Copper Blue B, 2B
	Diazo Black BHN
Black:	Benzo Chrome Black B, N
	Direct Deep Black brands (without copper)

24. Benzo colours which are employed for the dyeing of cotton linings.

Red:	Benzo Fast Red 9BL, FC, GL, L
	Benzo Fast Scarlet brands
	Benzo Purpurine 1B, 4B, 10B
	Benzo Rhoduline Red B, 3B
	Congo Corinth B, G
	Geranine G
Orange:	Benzo Fast Orange S
	Chloramine Orange G
	Congo Orange G, R, RG
	Pluto Orange G
Yellow:	Chloramine Yellow C, FF, HW, M, W extra
	Chrysophenine G, GL extra
	Direct Yellow R, R extra
Green:	Benzo Dark Green B, GG
	Benzo Green BB, C, G
Blue:	Benzo Azurine G, 3G
	Benzo Chrome Black Blue B
	Benzo Sky Blue conc., 4B
	Benzo Black Blue 5G
	Brilliant Azurine B, 5G, R, 2R, 5R
	Brilliant Fast Blue B, 2G
	Brilliant Sky Blue G, 5G
	Diazo Blue 3R (D. A)
	Diazo Dark Blue 3B (D. A)
	Diazo Black BHN, BHN extra, R, R extra (direct)
Violet:	Azo Violet
	Benzo Violet R
	Brilliant Benzo Violet B, 2R
Brown:	Benzo Brown MC
	Benzo Chrome Brown B, G
	Benzo Nitrole Brown G (Paranitr.)

Brown: Direct Fast Brown B
Pluto Brown GG, NB, R

Grey&Black: Benzo Chrome Black (Aniline Salt)
Benzo Fast Black, L
Diazo Fast Black BHX (D. A) (D. H)
Diazo Black 2B, BHN, BHN extra (D. A) (D. H)
Direct Blue Black B
Direct Deep Black brands
Pluto Black A extra, BS extra, CF extra, CR, F extra, G, SS extra

25. Benzo colours which are adapted for the dyeing of cops, cheeses, etc.

All dyestuffs remarkable for very good solubility are adapted for this purpose. We refer to chapter 10, page 12.

26. Benzo colours which can be employed for the dyeing of sewing yarn.

The direct dyeing Benzo colours will suffice in most cases for inferior qualities of thread, on the other hand the diazotised and coppered shades or the Katigen dyestuffs are preferred for superior qualities on account of their better fastness to washing and light.

Red: Benzo Fast Red 9BL
Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
Benzo Nitrole Bordeaux G (Paranitr.)
Benzo Purpurine 4B, 10B
Diazo Brilliant Scarlet brands (D. A)
Geranine G
Hessian Purple N
Yellow PR (Primuline) (D. A)

Orange: Benzo Fast Orange S
Benzo Orange R
Chloramine Orange G
Pluto Orange G
Toluylene Orange G

Yellow: Chloramine Yellow GG, M
Chrysamine G
Chrysophenine G, GL extra
Direct Yellow R, R extra
Thiazole Yellow G

Green: Benzo Dark Green B
Benzo Green BB

Blue:	Benzo Blue RW (cu.)
	Benzo Chrome Black Blue B
	Benzo Copper Blue B, 2B (cu.)
	Benzo Sky Blue
	Benzo Black Blue G
	Brilliant Azurine R
	Brilliant Benzo Blue 6B (cu.)
	Brilliant Fast Blue B, 2G
	Diazo Indigo Blue B, BR extra, M (D. A)
Violet:	Azo Violet
	Benzo Violet R
Brown:	Benzo Chrome Brown B, G, 5G, 3R
	Pluto Brown R
	Toluylene Brown M
Black:	Benzo Chrome Black B, N (Aniline Salt)
	Benzo Chrome Black N (cr. cu.)
	Diazo Brilliant Black B (D. A)
	Diazo Fast Black 3B, G (D. H), BHX (D. A & H)
	Diazo Fast Black 3B, G (D. H, cu.)
	Diazo Black 2B, 3B, BHN, R (D. A)
	Direct Deep Black brands
	Pluto Black BS extra, F extra, G.

Mercerising.

The mercerising of yarn. The following points must be observed. The temperature of the mercerising bath should not exceed 65° Faht., the wetting out of the goods with soda lye (48—57° Tw.) should be done as uniformly as possible, for which reason 5—6% alcohol is generally added to the bath. The duration of the process for each lot of goods should be alike, and the greatest care should also be bestowed on the rinsing or acidulating process. Well bleached goods obtain a higher lustre than raw goods.

The mercerising of woven materials. The characteristic features in the process of mercerising piece goods — apart from several deviations made in certain works — are briefly the following: A number of pieces (5—10) are sewn evenly together after being singed and without being previously wetted out, and wound uniformly on a roller. The goods are passed from this roller at as high a pressure as possible (for example, on the Foulard) through soda lye (16—24° Tw.) until thoroughly saturated. — An addition of denaturated alcohol to the lye for the purpose of wetting out the goods easier is advisable. The mercerising liquor should be kept at a low temperature by cooling with ice, as during the process of mercerising the liquor gets warm. When taken

out of the lye, squeeze well, allow to run for some time at tension, wash with warm water also at tension and acidulate. After this rinse thoroughly by means of a squirter. For many colours, for instance the Katigen dyestuffs, the lye is not neutralised by acid, the goods being merely subjected to a good rinsing.

Directions for dyeing. Light shades are dyed best at 105° Fath. with the addition of about 10% soap, medium shades at 140° Faht. with 10% Glauber's salt cryst. (5% calc.) and 10% soap, dark shades near the boil with 20% Glauber's salt cryst. (10% calc.) and 5% soda cryst. (2% soda ash). It is advisable to enter the goods lukewarm and to gradually raise the temperature to the above. (Those dyestuffs marked with an asterisk are dyed with the addition of Glauber's salt and acetic acid.)

Special care must be taken not to add the colour nor the Glauber's salt — where such is employed — in one portion at the commencement, but to wait until the goods have been worked for some time and then to add same in several portions, turning off steam at the same time. It is sometimes advisable when dyeing yarn to wring occasionally. Turkey Red oil is used now and then in place of soap for piece goods, the material, however, has a limp feel when dyed in this way, so that where this is not desired the application of soap is preferred.

For the purpose of giving the yarn a scroop feel, a characteristic often desired, it will be found that acetic acid, which is very volatile, is itself of little use. A mixture of acetic and lactic acid (10 cc each per liter) or this combination in conjunction with one or several passages through a soap bath renders good service. The soap-passage is absolutely necessary for unbleached yarn, if the harsh feel is wanted.

27. Benzo colours suited for the dyeing of mercerised cotton yarn and piece goods.

Red:
Benzo Fast Red 9BL, FC, GL, L
Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
Benzo Purpurine 1B
Benzo Rhoduline Red B, 3B
Benzo Red 10B, 12B
Brilliant Congo R
Brilliant Geranine B
Delta Purpurine 5B
Diazo Brilliant Scarlet brands (D. A)
Diazo Bordeaux, 7B (D. A)

Red: Diazo Rubine B (Primuline) (D. A)
Geranine G
Yellow PR (Primuline) (D. A)

Orange: Benzo Fast Orange S
Chloramine Orange G
Congo Orange G, R, RG
Pluto Orange G

Yellow: Benzo Fast Yellow 5GL
Chloramine Yellow brands
Chrysophenine G, GL extra, R
Direct Yellow R, R extra
Thiazole Yellow 3G

Green: Benzo Green C, G
Brilliant Benzo Green B

Blue: Benzo Azurine G, 3G, R, 3R,
Benzo Blue 2B, 3B, BX, 2R, 4R, RW
Benzo Chrome Black Blue B
Benzo Fast Blue B, BN, G, R, 5R
Benzo Indigo Blue
Benzo Copper Blue B, 2B
Benzo Navy Blue B
Benzo Sky Blue (direct and cu.)
Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G, R, 2R, 5R
Brilliant Benzo Blue 6B (direct or coppered)
Brilliant Fast Blue B, 2G
Brilliant Sky Blue G, 5G
Diazo Indigo Blue BR extra, 3R, 2RL, 4RL (D. A)
Diazo Black BHN, R extra

Violet: Benzo Fast Violet R
Benzo Violet R, RL extra
Brilliant Benzo Violet B, 2R
Chloramine Violet R
Heliotrope BB

Brown: Benzo Brown MC
Benzo Chrome Brown CR, G, 5G, 3R
Pluto Brown GG, NB, R

Black: Benzo Chrome Black B, N (cr. cu.)
Benzo Fast Black L
Diazo Brilliant Black B (D. A) (D. B)
Diazo Fast Black B, BHX, BZ (D. A), SD (D. A & F)
Pluto Black A, 3B extra, BS extra, CR, G, SS extra, TG extra

28. Benzo colours which stand mercerising i. e. which do not bleed in this process.

The dyestuffs marked with an asterisk also stand the process when dyed in dark shades.)

Red: Benzo Fast Red L
Benzo Fast Pink 2BL
Benzo Purpurine 1B, 4B, 10B
Benzo Rhoduline Red 3B
Brilliant Geranine B
*Congo Corinth B, G
Congo Red

Orange: Orange TA

Yellow: Benzo Fast Yellow 5GL
Chloramine Yellow GG, HW, M, RC
Chrysamine G, R
Chrysophenine G, GL extra, R
Direct Yellow R
Thiazole Yellow G, R

Green: Benzo Dark Green GG
Benzo Green G
Brilliant Benzo Green B
*Benzo Olive

Blue: Benzo Azurine G, 3G, R, 3R
Benzo Blue BX
*Benzo Chrome Black Blue B
Benzo Cyanine 3B, R
Benzo Fast Blue B, BN, G, R, 5R
*Benzo Indigo Blue
*Benzo Navy Blue B
Benzo Copper Blue B, 2B
Benzo Sky Blue 4B
*Benzo Red Blue G
*Benzo Black Blue G, 5G, R
Brilliant Azurine B, 5G*, 2R, 5R
Brilliant Benzo Blue 6B
Chicago Blue B*, R
Congo Blue 2B
Diazo Blue Black
Diazo Black B, 3B*, R extra*

Violet: Azo Violet
Benzo Violet RL extra
Brilliant Benzo Violet B, 2R
*Chloramine Violet R

Brown: Benzo Brown D3G extra*, RC
Benzo Chrome Brown B*, BS*, CR*, R, 3R
Diazo Brown G
Direct Fast Brown B, GG

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Brown: Pluto Brown GG, R
Black: Benzo Chrome Black B, N
Benzo Fast Black L
Diazo Black 2B
Direct Blue Black B, N
Direct Deep Black brands
Pluto Black A, A extra, 3B extra, BS extra, CR*, CF extra*, F extra*, G, SS extra, TG extra*

29. Benzo colours especially serviceable for fancy woven articles.

Red: Benzo Fast Pink 2BL
Benzo Fast Red 9BL (as pink), FC (fluoride of Chrome), L
Benzo Nitrole Bordeaux G (Paranitr.)
Benzo Rhoduline Red B, 3B
Brilliant Geranine B
Diazo Bordeaux 7B (D. A)
Diazo Brilliant Scarlet brands (D. A)
Diazo Rubine (D. A)
Geranine G
Yellow PR (Primuline) (D. A)
Orange: Chloramine Orange G
Yellow PR (Primuline) (D. F)
Yellow: Chloramine Yellow FF, GG, HW, M
Chrysophenine G
Direct Yellow R, R extra
Thiazole Yellow G, GL
Green: Benzo Dark Green B, GG (fluoride of Chrome)
Benzo Green BB, G (fluoride of Chrome)
Blue: Benzo Azurine G, 3G (cu.)
Benzo Chrome Black Blue B
Benzo Cyanine B
Benzo Fast Blue BN
Benzo Indigo Blue
Benzo Copper Blue B, 2B (cu. or cr. cu.)
Benzo Navy Blue B
Benzo Sky Blue
Brilliant Azurine 5G (cu.), R
Brilliant Benzo Blue 6B (direct or cu,)
Brilliant Fast Blue B, 2G (in medium shades)
Diazo Blue 3R (D. A)
Diazo Dark Blue 3B (D. A)
Diazo Indigo Blue BR extra, M, 3R, 2RL, 4RL (D. A)
Diazo Red Blue 3R (D. A)

Blue: Diazo Black BHN
Diazurine B (D. A)
Violet: Benzo Fast Violet R
Benzo Violet R, RL extra
Brilliant Benzo Violet B, 2R
Chloramine Violet R
Brown: Benzo Brown BX, MC
Benzo Chrome Brown B, CR, G, 5G (cr. cu.)
Benzo Nitrole Brown G, 2R (Paranitr.)
Chloramine Brown G
Diazo Brown G, R extra (D. A)
Direct Fast Brown B (Paranitr.)
Pluto Brown R (Paranitr.)
Grey: Benzo Fast Black
Black: Benzo Chrome Black N (Aniline salt)
Benzo Chrome Black Blue B (Aniline salt)
Benzo Fast Black L
Diazo Brilliant Black B (D. A)
Diazo Fast Black 3B, H (D. H)
Diazo Black 2B, BHN (D. A) (D. H)
Pluto Black brands (formaldehyde), CR (cr.)
Direct Deep Black brands (formaldehyde)

30. Benzo colours used for the dyeing of canvas, etc.

(The shades have to be fast to light and water; therefore the necessary care must be taken to choose dyestuffs possessed of these qualities.)

Yellow: Chloramine Yellow FF, HW, M
Chrysophenine G, R
Direct Yellow R, R extra
Green: Benzo Dark Green B
Benzo Green BB, G (fluoride of chrome)
Blue: Benzo Azurine G (cu.)
Benzo Copper Blue B, 2B (cu.)
Diazo Blue 3R (D. A, cu.)
Diazo Dark Blue 3B (D. A, cu.)
Diazo Indigo Blue BR extra, M, 2RL, 4RL (D. A)
Brown: Benzo Chrome Brown G, 3R (direct)
Benzo Chrome Brown brands (cr. cu.)
Benzo Brown BC (cr. cu.)
Chloramine Brown G
Direct Deep Black brands (cr. cu.)
Grey: Benzo Chrome Black (cr. cu.)
Black: Direct Blue Black N
Direct Deep Black brands (direct)
Pluto Black G

Katigen Colours.

The Katigen colours are insoluble in water in most cases, thus deviating from the Benzo colours, and are dissolved with sulphide of soda (100 parts crystals equal 47,1 parts concentrated sulphide of soda). When buying, we recommend caution, as inferior qualities of sulphide of soda are often met with on the market.

Dissolving the dyestuff. The single brands are dissolved with the same amount of sulphide of soda crystals as colour taken, the extra brands with double the amount, in a little boiling water, but never in the whole liquor. The following extra brands are dissolved with an equal amount of sulphide of soda crystals as colour: Katigen Black BFC extra, TW extra, WR extra, 2R extra, Katigen Deep Black B and Katigen Black Brown BW extra conc. The Black brands on account of their ready solubility can be added direct to the dyebath.

Preparation of the dyebath. Employ, according to the hardness of the water and the depth of shade required, 2—8 % soda ash and 10—60 % Glauber's salt cryst. (5—30 % common salt). Boil the bath with the soda and skim off if necessary; then add the solution of colour and sulphide of soda, boil again and add the Glauber's salt. It is advisable to add an equal amount of glucose as colour when working the Katigen Indigo brands.

When dyeing in standing baths 40 % less colour is generally used and the amounts of sulphide of soda and glucose are also reduced proportionately. The subsequent additions of Glauber's salt and soda depend upon the quantity of water added to the bath to replenish the liquor lost during the dye-process.

The dyeing of the Katigen Indigo brands with the aid of Katigen Intensifier B (patent applied for). By an addition of Katigen Intensifier B deeper and more level shades are obtained, without increasing the amount of colour.

Dissolve the dyestuff with twice as much sulphide of soda crystals in boiling water and add same to the bath, which should be at a temperature of 100—120° Faht. Then add 10—50 % Glauber's salt cryst. (5—25 % common salt) and after this an amount of Katigen Intensifier B corresponding to about $^1/_2$ the weight of the colour. Strew the Intensifier direct into the bath, which should not be above 120° Faht., or dissolve it previously in lukewarm water. An addition of soda is only necessary for the first bath to rectify the water. Finally add 3 % soft soap, which has the effect of removing any possible bronzy tone and gives the goods a soft and full handle even during the dyeing.

Dye for 1 hour at 100—120° Faht. immersed in the liquor, then wring out well, expose to the air until the oxidation is complete, and finally rinse. Loose cotton is piled in heaps after being dyed, and allowed to oxidise. Cops are drained after dyeing by means of vacuum, allowed to oxidise $^1/_2$ hour and rinsed. Piece goods are dyed as mentioned above and then submitted to the well known air oxidation by means of the roller system.

Dyeing in open vessels or dye-becks. Dye as a rule for $^1/_4$ hour at the boil in a volume of dyeliquor of from 15—10:1 of goods, and work for another $^3/_4$ hour with turned-off steam.

The Katigen Indigo brands form an exception and yield the best results at 140° Faht. immersed in the liquor, whereby a better levelling is ensured. After dyeing squeeze well, level on the posts, and then rinse; goods rinsed immediately after dyeing come out lighter and more grecnish.

All colours excepting the Katigen Indigo Brands and Katigen Dark Blue R extra, must be thoroughly rinsed directly the superfluous liquor has been removed. It is advisable in many cases after squeezing, to treat Blacks on yarn and pieces in a warm rinsing bath at 85—100° Faht. containing 2—3% sulphide of soda (of the weight of the goods). Work for some time in this bath and finish the process in fresh rinsing baths (2—3 are sufficient as a rule). The rinsing bath containing the sulphide of soda can be used for further lots after adding 0,5—1% sulphide of soda, that is for replenishing the dyebath and for dissolving the dyestuff.

Dyeing in machines.

When dyeing in machines the volumes of dyeliquor are smaller and depend upon the construction of the apparatus; the amounts of dyestuff, soda and salt must also be proportionately lessened. When dyeing in very short liquors it is advisable to increase the addition of sulphide of soda and to decrease the amount of salt.

Dyeing cold. Dyeing cold has the advantage, in comparison to the ordinary method of dyeing, of enabling the dyer to work more conveniently and, above all, of a slower oxidation of the colour, — whereby level dyeing is aided considerably — not to mention the advantage derived from the saving in steam. Boil the colour well with the sulphide of soda crystals and a little water, add the solution to the cold bath containing soda, and then add the common or Glauber's salt. In this case also an addition of glucose (as for Katigen Indigo) to the dyebath furthers the level dyeing.

Steaming. The brightness and bluish tone of the Katigen Black and Blue shades are increased by steaming; this process is particularly resorted to for Katigen Navy Blue R extra, Katigen Indigo 4RO extra and 23990. As a simple and practical arrangement for carrying out the steaming process, an ordinary wooden vat lined inside with canvas, may be employed in such a manner that the steam pipe is also covered. The vat should be closed with a wooden lid similarly wrapped. Admit the steam and air simultaneously for $^3/_4$ hour by means of an injector. The hotter and drier the steam, the quicker and more complete will be the development. Afterwards rinse and hydro-extract in the usual manner.

After-treatment with metallic salts. This process is necessary to obtain the correct shade of Katigen Chrome Blue 5G, 2R, and Katigen Chrome Brown 5G; it is frequently applied, however, to increase the fastness to washing, boiling and light of other dyestuffs; in such instances work for $^1/_2$ hour at about 200° Faht., according to the depth of shade required, with

2—3% bichrome
2—3% copper sulphate and
3—5% acetic acid.

We would particularly caution against the employment of sulphuric acid in place of acetic acid.

If it is desired to improve the fastness to light more especially, for instance with khaki shades on piece goods, decrease the amount of bichrome somewhat and increase the addition of copper sulphate up to 4% if necessary.

Oiling. (Brightening.) This treatment has the effect of rendering hard material soft and also of removing the bronziness of overdyed blacks. The Katigen Blacks assume fuller shades of a bluer cast when oiled. Oil for example for $^1/_4$ hour lukewarm with

2% Turkey Red oil (of the weight of the goods)
$^1/_2$% ammonia

or with

2% soap
1—2% olive oil and
$^1/_4$% soda

In order to produce the crisp handle, especially on finely spun yarn, treat with

2% powdered gum
2% liquid paraffin and
1% starch,

which preparation produces good results; work for $^1/_4$ hour at 100—120° Faht. in a volume of dyeliquor of 20: 1 of goods.

The dyeing of cotton materials containing white or coloured silk checking threads. Mercerise the goods before dyeing or treat same without tension with soda lye such as used in the mercerising process, in order to increase the affinity of the cotton. It is far more difficult to obtain sufficiently deep shades on the cotton and at the same time clear effect threads on goods which are not mercerised. To protect the silk as much as possible from the detrimental influence of the lye, add about 1 part glycerine to every 9 parts lye.

When dyeing the cotton a black shade prepare the first bath according to the depth of shade required with

5 grms Katigen Black TW extra
7,5 „ sulphide of soda cryst.
3 „ soda ash
40 „ Glauber's salt cryst. and
20—30 „ caseine

per litre liquor.

When working in a standing bath, reduce the amount of colour by $^1/_3$, and that of caseine by $^1/_2$. Of soda and Glauber's salt only add as much as approximately corresponds with the loss of liquor. The bath can only be reserved for a limited time.

Dye in the dye-beck or in the jigger at 100° Faht. for $^3/_4$—1 hour, rinse thoroughly in cold water, and soap at the boil. When a very bloomy shade of black is wanted, treat after dyeing and rinsing for another $^1/_2$ hour at 100 to 120° Faht. with: —

2% Bichrome
2% Copper sulphate
4% Acetic acid,

rinse and soap.

Dissolving the caseine. Stir the caseine into a paste with a little water, add to each 1 lb. — according to the intended concentration — 1—2 gallons cold water, heat to 160—175° Faht. and subsequently add 50—75 cc ammonia. A uniform solution is only obtained after adding the ammonia. In such cases where it is desired to make the solution stable, add after dissolving about 5 cc Formaldehyde (40%) for every 1 lb caseine. In order to obtain coloured effects, the silk is afterwards dyed in a fresh bath with acid colours. Coloured checking threads can also be produced by weaving such silk shades with the raw material as will resist the above mentioned mercerising and acidulating processes, as well as the subsequent cross-dyeing with Katigen colours. (Compare chapter 44 page 37.)

The topping of Katigen colours with Basic colours. As Basic colours fall on very quickly, in topping Katigen

colours, whereby uneven shades easily occur, it is necessary to exercise the utmost care when dyeing in this manner. Small quantities of Basic colour had better be dyed in a cold soap bath, and only when employing large quantities of colour the shading may be carried out — with the necessary caution — in an acetic acid or alum bath. Rinse the goods thoroughly before top-dyeing.

The dyeing of Katigen and Benzo colours in one bath. A few Benzo colours are occasionally employed for brightening Katigen shades, and this is done by dissolving the dyestuffs separately, adding same to the dyeliquor and dyeing as usual with Katigen colours. (Compare chapter 44, page 37.)

31. List of Katigen colours.

Yellow:	Katigen Yellow G, GG extra
Green:	Katigen Green 2B, 2BX, 4B, 2G
	Katigen Olive G, GN
Blue:	Katigen Blue B
	Katigen Chrome Blue 5G, 2R (chromed)
	Katigen Dark Blue R extra
	Katigen Indigo B, B extra, CL extra, CLG extra, G extra, R extra, RL extra, 2RL extra, 5RL extra, 23990, 4RO extra
	Katigen Navy Blue R extra
Violet:	Katigen Violet B
Brown:	Katigen Brown 2R, 4R, V extra
	Katigen Chrome Brown 5G (chromed)
	Katigen Yellow Brown GG, GG extra, 5G extra, GR extra, O extra, R extra
	Katigen Cutch B
	Katigen Khaki G extra
	Katigen Red Brown R, 3R
	Katigen Black Brown B, BW, N, R, BR (all extra concd.)
Black:	Katigen Blue Black B, B extra, 4B, 4B extra, G, NB extra, R
	Katigen Brilliant Black B extra
	Katigen Black 2B, BFC extra, 2R extra, ST extra, SW, SW extra, SWR extra, T extra, T extra conc., TG extra, TW extra, TX extra, WR extra
	Katigen Deep Black B

32. Katigen colours fast to ammonia 20%.

The Katigen colours are fast to ammonia excepting:
Katigen Brown 2R, 4R

Katigen Red Brown R, 3R
Katigen Violet B

33. Katigen colours, which are exceedingly fast to washing.

The direct shades of most Katigen colours are excellently fast to washing. The following are only sufficiently fast:

Katigen Yellow G, GG extra
Katigen Violet B
Katigen Brown 2R, 4R
Katigen Red Brown R, 3R
Katigen Cutch B

34. Katigen colours which are remarkable for their good or comparatively good fastness to boiling.

Yellow: Katigen Yellow G, GG extra (cr. cu.)
Green: Katigen Olive G, GN (cr. cu.)
Blue: Katigen Blue B
Katigen Indigo brands (cr. cu.) (except CLG extra)
Katigen Dark Blue R extra
Brown: Katigen Brown V extra (direct or cr. cu.)
Katigen Chrome Brown 5G (cr. cu.)
Katigen Yellow Brown GG, GG extra, 5G extra, GR extra, O extra, R extra (cr. cu.)
Katigen Cutch B (cr. cu.)
Katigen Khaki G extra (cr. cu.)
Katigen Black Brown B extra concd., BW extra concd., N, N extra concd., R extra conc. (direct or cr. cu.)
Violet: Katigen Violet B (cr. cu.)
Black: Katigen Blue Black G, NB extra
Katigen Brilliant Black B extra
Katigen Black BFC extra, 2R extra, ST extra, SW, SW extra, SWR extra, T extra, T extra conc., TG, TG extra, TW extra, TX extra, WR extra
Katigen Deep Black B

35. Katigen colours fast to cross-dyeing.

All these brands also withstand mordanting with bichrome, but the Katigen Yellow Brown and Katigen Red Brown brands are thereby turned slightly duller.

Green: Katigen Green 2B
Katigen Olive G, GN

Blue: Katigen Blue B
Katigen Chrome Blue 5G (cr. cu.)
Katigen Dark Blue R extra
Katigen Indigo B extra, CL extra, CLG extra, G extra, R extra, RL extra, 2RL extra, 5RL extra, 4RO extra, 23990
Katigen Navy Blue R extra

Brown: Katigen Brown 2R, 4R, V extra
Katigen Yellow Brown GG extra, 5G extra, GR extra, O extra, R extra
Katigen Khaki G extra
Katigen Red Brown R, 3R
Katigen Black Brown brands

Black: Katigen Blue Black B, 4B, 4B extra, G, NB extra, R
Katigen Brilliant Black B extra
Katigen Black brands
Katigen Deep Black B

The yellowish brown Katigen colours when cross-dyed with certain wool colours are dulled more or less.

36. Katigen colours fast to ironing.

All brands are fast to ironing.

37. Katigen colours fast to light.

The Katigen colours are exceedingly fast to light and quite excel in this respect, similar shades of direct dyeing cotton dyestuffs.

Those moderately fast to light are:

Katigen Yellow G, GG extra
Katigen Brown 2R, 4R
Katigen Yellow Brown GG extra, GR extra
Katigen Red Brown R, 3R

38. Katigen colours which are relatively fast to stoving.

Yellow: Katigen Yellow G, GG extra

Green: Katigen Olive GN (cr. cu.)

Blue: Katigen Indigo B extra, CL extra, CLG extra, G extra, R extra, RL extra, 2RL extra, 5RL extra, 4RO extra, 23990
Katigen Dark Blue R extra
Katigen Navy Blue R extra

Brown: Katigen Brown 2R, 4R, V extra
Katigen Chrome Brown 5G (cr. cu.)
Katigen Yellow Brown GG, GG extra, 5G extra, GR extra, O extra, R extra

Brown: Katigen Red Brown R, 3R
Katigen Black Brown brands
Black: Katigen Black brands
Katigen Deep Black B

39. Katigen colours which are comparatively fast to chlorine.

Katigen Indigo CL extra, CLG extra
Katigen Violet B

40. Katigen colours the fastness of which is increased by an after-treatment with chrome and copper.

(Those colours with which the after-treatment cannot be omitted are marked with an asterisk)

Yellow: Katigen Yellow G, GG extra
Green: Katigen Olive G, GN.
Blue: *Katigen Chrome Blue 5G, 2R
Katigen Dark Blue R extra
Katigen Indigo B extra, CLG extra, G extra, R extra, RL extra, 2RL extra, 5RL extra
Brown: Katigen Brown 2R, 4R, V extra
*Katigen Chrome Brown 5G
Katigen Yellow Brown GG, G G extra, 5G extra, GR extra, O extra, R extra
Katigen Cutch B
Katigen Khaki G extra

41. Katigen colours which can be dyed cold.

Green: Katigen Green 2BX, 2G
Blue: Katigen Dark Blue R extra
Katigen Indigo B extra, CL extra, CLG extra, RL extra, 2RL extra, 5RL extra, 23990, 4RO extra
Black: Katigen Black BFC extra, SWR extra, T extra, TW extra, WR extra

Other Katigen colours besides the above mentioned are also adapted for dyeing cold, but they do not show to better advantage when dyed in this manner.

42. Katigen colours adapted for the dyeing of cotton material containing white or coloured silk effects.

Green: Katigen Olive GN
Blue: Katigen Blue B
Katigen Chrome Blue 5G, 2R (cr. cu.)
Katigen Navy Blue R extra

Brown:	Katigen Brown 2R, V extra
	Katigen Chrome Brown 5G (cr. cu.)
	Katigen Yellow Brown brands
	Katigen Khaki G extra
	Katigen Red Brown R, 3R
	Katigen Black Brown brands
Black:	Katigen Blue Black B extra
	Katigen Brilliant Black B extra
	Katigen Black TW extra, SWR extra, No. 23875

43. Colours adapted for dyeing silk effects which have to resist cross-dyeing with Katigen colours.

Red:	*Benzo Fast Scarlet 4BS
	Diazo Bordeaux, 7B (D. A)
	Diazo Brilliant Scarlet brands (D. A)
	Diazo Rubine B (D. A)
	Yellow PR superfine (Primuline) (D. A)
Yellow:	Anthracene Yellow C (cr.)
Green:	Brilliant Acid Green 6B
Blue:	Sulphon Azurine D
	Victoria Blue B
Brown:	Benzo Chrome Brown G, 3R (cr. cu.)

*This brand should only be used in small quantities for shading.

44. Benzo colours which can be dyed in one bath with Katigen colours.

Red:	Benzo Fast Scarlet 4BS
	Benzo Rhoduline Red B
	Geranine G
Orange:	Chloramine Orange G
Yellow:	Chloramine Yellow HW
Blue:	Benzo Sky Blue
Violet:	Benzo Fast Violet R

45. Basic colours which can be dyed in one bath with Katigen colours.

Red:	Saffranine FF extra
	Rhoduline Red G
	Brilliant Rhoduline Red B
	Rhodamine B, G
Yellow:	Chrysoidine G
	Auracine G

Basic colours.

Directions for dyeing. Mordant the material before dyeing with 2—6% tannic acid and dark shades with sumac (1 part tannic acid equals about 8—10 parts sumac); enter the goods at 140—160° Faht. and work the cotton for a few hours in the cooling down liquor. Yarn is put in the liquor over night if convenient. The goods must be completely covered by the mordanting liquor. Then squeeze the goods, and without rinsing, treat for 20—30 minutes in a cold bath containing 1—3% tartar emetic or antimony salts, after this rinse thoroughly. When dyeing dark shades the tannic acid is usually fixed with ferrous salts instead of antimony salt (about 3% ferrous sulphate or ferric pyrolignite 3° Tw,); then rinse the goods thoroughly and if necessary run through a solution of whitening.

The dyeing is carried out as a rule with the addition of 1—2% acetic acid or alum, entering cold and raising the temperature slowly to 120—140° Faht. at the most.

Seeing that the Basic colours fall on quickly, thus easily turning out unlevel in shade, it is advisable to add the colour solution in several portions and to raise the temperature slowly.

During the mordanting with tannic acid or during the dyeing process, the material must not come into contact with iron, as same causes black stains; it is best to employ wooden vats or stone vessels.

Delicate pink shades are sometimes dyed with the Rhodamine brands on an alumina-oil mordant. In such instances the cotton is treated for a short time in a solution of

1 part Turkey red oil and
9 parts water,

squeezed out as uniformly as possible and dried at about 100° Faht., after this the cotton is put in a bath containing acetate of alumina (1—1½ gallons acetate of alumina 8° Tw. per 200 gallons,) worked several times, squeezed out and dried. Both these processes are repeated 2—3 times, and after the last treatment with acetate of alumina the cotton is rinsed in a cold bath.

Many Basic colours, such as Victoria Blue and Indon Blue also fix well on cotton which has not been mordanted. When dyeing with Victoria Blue add to the bath 1—2% sulphate of alumina or 2—4% alum, enter the goods lukewarm, bring slowly to the boil, turn off steam and dye without further heating. The goods are then dried without being rinsed. When dyeing with Indon Blue proceed in the same way as mentioned above, but allow the liquor

to boil for some time and finally rinse slightly. Concentrated liquors must be employed for this process.

46. List of Basic colours.

Red:	Brilliant Rhoduline Red B
	Diamond Fuchsine
	New Magenta
	Pyronine G
	Rhodamine B, B extra, G, G extra
	Rhoduline Pink (Rhodamine) 4G, 5G
	Rhoduline Scarlet G
	Rhoduline Red G
	Saffranine FF extra, superfine yellow shade
Orange:	Chrysoidine G
	Rhoduline Orange N, NO
Yellow:	Auracine G
	Auramine O, II
	Coriphosphine 5G, O
	Rhoduline Yellow 6G
Green:	Brilliant Green crystals
	China Green crystals
	Methylene Green B
Blue:	Cotton Blue I, II, IV, VI
	Indone Blue BB, RR
	Night Blue extra green shade
	Methylene Blue BB, B, R, RR, zinc free (ZF)
	New Blue D, R extra
	New Methylene Blue F, FR
	New Victoria Blue B
	Rhoduline Sky Blue BB
	Turquoise Blue BB, G
	Victoria Blue B
Violet:	Brilliant Rhoduline Violet R
	Crystal Violet P, cryst.
	Methyl Violet 1B—7B, 1R—5R
	Rhoduline Heliotrope B, 3B
	Rhoduline Violet
Brown:	Bismarck Brown F, M, R extra
Grey:	New Fast Grey
Black:	Jute Coal Black S
	Jute Black B

47. The fastest to light of the Basic colours are

Red:	Brilliant Rhoduline Red B
	Rhoduline Red G
Yellow:	Auramine O
	Rhoduline Yellow 6G

Green:	Methylene Green B
Blue:	Indone Blue BB, RR
	Methylene Blue BB, B, R
	New Blue D, R extra
	New Methylene Blue F, FR
	Rhoduline Sky Blue BB
Violet:	Rhoduline Heliotrope B
Brown:	Bismarck Brown F, M
Grey:	New Fast Grey

48. Basic colours which are rendered faster to light by an after-treatment with copper sulphate.

Treat the shades for 15—20 minutes at 120—140° Faht. with the addition of 1—3% copper sulphate and a little acetic acid. The after-treatment in most cases occasions the shade to alter more or less.

Red:	Brilliant Rhoduline Red B
	Diamond Fuchsine
	New Magenta
	Pyronine G
	Rhodamine B, G, G extra
	Rhoduline Pink (Rhodamine) 4G
	Rhoduline Red G
Yellow:	Auramine O
	Rhoduline Yellow 6G
Green:	China Green cryst.
Blue:	Cotton Blue I, II, IV, VI
	New Victoria Blue B
	Turquoise Blue BB, G
	Victoria Blue B
Violet:	Crystal Violet P
	Methyl Violet 1B—6B, 1R—5R
	Rhoduline Heliotrope 3B
Black:	Jute Coal Black S

49. The fastest to washing of the Basic colours.

The fastness to washing of all Basic colours is increased by after-treating with tannic acid. This treatment is carried out by placing the dyeings again in the mordanting baths prepared with half the amounts of tannic acid and tartar emetic originally employed. The goods are worked for 1—1½ hours in the tannic acid bath and about 10 to 15 minutes in the tartar emetic bath and afterwards rinsed. The following Basic colours are also comparatively fast to washing without the after-treatment with tannic acid.

Red:	Pyronine G
	Rhoduline Pink (Rhodamine) 4G, 5G
	Rhoduline Scarlet G
Orange:	Rhoduline Orange N, NO
Yellow:	Rhoduline Yellow 6G
Green:	Methylene Green B
Blue:	Indone Blue BB
	Methylene Blue BB, B, R, RR, zinc free (ZF)
	New Victoria Blue B
	Rhoduline Sky Blue BB
	Turquoise Blue BB, G
Violet:	Brilliant Rhoduline Violet R
	Crystal Violet cryst., P
	Rhoduline Heliotrope B, 3B
Grey:	New Fast Grey

50. Basic colours fast to sizing and mangling.

With the exception of Rhodamine B extra, G extra, Chrysoidine G, and Bismarck Brown M, the Basic dyestuffs are fast to sizing and mangling when after-treated with tannic acid. The following are also fast to sizing and mangling without being aftertreated.

Red:	Pyronine G
	Rhodamine G (Oil Mordant)
Yellow:	Auramine O, II
	Rhoduline Yellow 6G
Green:	Methylene Green B
Blue:	Cotton Blue I, II, IV, VI
	Methylene Blue, zinc free (ZF)
	New Blue D, R extra
	New Victoria Blue B
	Rhoduline Sky Blue BB
	Turquoise Blue BB, G
Grey:	New Fast Grey

51. Basic colours which are fast to ammonia 20%.

Red:	Brilliant Rhoduline Red B
	Pyronine G
	Rhodamine B, B extra, G, G extra
	Rhoduline Pink (Rhodamine) 4G, 5G
	Rhoduline Scarlet G
	Rhoduline Red G
	Saffranine FF extra, superfine yellow shade
Orange:	Rhoduline Orange N, NO
Yellow:	Auracine G
	Auramine O
	Rhoduline Yellow 6G

Green:	Methylene Green B
Blue:	Indone Blue BB
	Methylene Blue BB, B, R, RR, zinc free (ZF)
	New Victoria Blue B
	Turquoise Blue BB, G
	Victoria Blue B
Violet:	Crystal Violet cryst., P
	Methyl Violet 1B—7B, 1R, 3R
	Rhoduline Heliotrope B, 3B
	Rhoduline Violet
Grey:	New Fast Grey

52. Basic colours which are fast to acetic acid 9° Tw.

Excepting

Crystal Violet P and crystals and the Methyl Violet brands

all Basic colours are fast to acetic acid.

53. Basic colours relatively fast to cross-dyeing when after-treated with tannic acid.

(Re directions for after-treating with tannic acid see chapter 49, page 40.)

Red:	Rhoduline Pink (Rhodamine) 4G
Yellow:	Rhoduline Yellow 6G
Green:	Brilliant Green cryst.
	Methylene Green B
Blue:	New Victoria Blue B
	Turquoise Blue BB, G
	Victoria Blue B
Violet:	Methyl Violet 7B, 1R

Brilliant Green crystals can be worked on a chrome mordant and also stands the after-treatment with chrome. New Victoria Blue B, Turquoise Blue BB, G, and Victoria Blue B only stand the after-treatment with chrome. The shades are thereby flattened more or less.

54. Basic colours fast to stoving.

Red:	Pyronine G
Orange:	Rhoduline Orange N, NO
Yellow:	Rhoduline Yellow 6G
Green:	Methylene Green B
Blue:	Cotton Blue IV
	Indone Blue BB, RR
	Night Blue extra green shade
	Methylene Blue BB, B, R, zinc free (ZF)

Blue: New Victoria Blue B
Grey: New Fast Grey

55. Basic colours, which are fast to chloride of lime solution $^{3}/_{4}{}^{0}$ Tw.

Methylene Blue brands.

56. Basic colours, which resist dry ironing.

All Basic colours withstand dry ironing or only change temporarily.

57. Basic colours, which bleed either slightly or not at all, when ironed damp.

Red: Pyronine G
Rhoduline Pink (Rhodamine) 4G
Orange: Rhoduline Orange N
Yellow: Auramine O
Rhoduline Yellow 6G
Blue: Methylene Blue BB
New Blue D, R extra
Grey: New Fast Grey

58. Basic colours which are employed for dyeing fancy woven articles.

For those rendered faster to washing by an after-treatment with tannic acid see chapter 49, page 40.

Acid Colours.

Directions for dyeing. Place the cotton over night in a stannate of soda solution 7° Tw., wring out and then treat for 2 hours in a bath containing alum 7° Tw., wring out and dye at 120° Faht. In place of this mordant, the above colours can be dyed direct with the addition of 5% alum, in this case at a temperature of 140° Faht.

59. List of Acid Colours.

Red: Brilliant Croceine 3B
Croceine Scarlet 10B—1B, 1R, 1BX—3BX, RX
Orange: Croceine Orange R, G
Mandarine G
Orange IIB

Yellow: Quinoline Yellow
Fast Light Yellow G, 2G, 3G
Indian Yellow G, GR, R
Blue: Alizarine Sapphirole B, SE

Dyeing with Mordant colours on an alumina mordant.

1. Yarn dyeing.

Scouring. Boil the cotton yarn for 2—3 hours with 2—3% soda calc., then wash well and hydroextract. The soda can also be substituted by caustic soda. Light pinks should be dyed on bleached cotton yarn.

Oiling. Soak the cotton yarn uniformly in a solution composed of 1 part Turkey red oil 50% and 9—10 parts water, after this hydroextract well and dry at 110° Faht. By an addition of 2¼—9 grms stannate of soda per gallon solution a more fiery shade is obtained.

(Now-a-days Monopole soap is often employed in place of Turkey red oil. For example, in order to produce a bright and fast Turkey Red shade, employ 2½—3 parts Monopole soap instead of 8 parts Turkey red oil 50%. The dyeing process itself is not altered.)

Mordanting with Alumina. Mordant, according to the depth of shade required, with sulphate of alumina free from iron or sulpho acetate of alumina 6—9° Tw., which is prepared as follows: Neutralize 2 lbs. sulphate of alumina with about 6½ oz calc. soda and bring up to about 2 gallons mordanting liquid 9° Tw., to this add 10 cc acetic 9° Tw. per quart. — Soak the cotton yarn uniformly, wring out well, and dry for about 24 hours at 110° Faht.

Chalking. Treat for ½ hour at 110° Faht. in a bath, containing about 1 oz. whitening per gallon water, then wash and dye without first drying.

Dyeing. The water used for dyeing must be somewhat calcareous (at least 5 German degrees of hardness); water harder than this should be corrected with acetic acid. In case the water is too soft add acetate of lime; water containing iron is useless. Acetic acid, Turkey red oil, tannic acid, or sumac, or chalk are now and then added to the dyebath in addition to the necessary amount of dyestuff. Dye first of all for ½ hour cold, then raise the temperature to 165° Faht. within ¾ of an hour and work for another ½—1 hour. After this wring out the yarn, oil again in 1 part Turkey red oil and 20 parts water, wring out once more, dry and steam for 1½ hours with 21 lbs. pressure.

Brightening. After the yarn has been steamed, work for 1—1 1/2 hours with 14 lbs. pressure, or for 2—3 hours without pressure, in a liquor containing 1 oz. Olive oil soap, 1 1/3 grms. soda calc. and 1 grm. stannate of soda per gallon water. Afterwards wash and dry. Only soda and soap are used for brightening blue shades of Turkey Red.

2. Piece Dyeing.

Slop-pad the cotton pieces twice in a solution composed of 1 part Turkey red oil 50% (neutralised with ammonia) in 4 parts water free from lime. After padding, dry well and steam for 1/4 hour at 7—14 lbs. pressure, or put same on the racks for 1—2 days in a warm damp room having a temperature of 100—120° Faht. Goods treated in this manner are then slop-padded once or twice with sulpho acetate of alumina 8—9° Tw., allowed to remain for 2 hours and again dried or put on the racks as stated above. After this fix on the jig by treating in a bath at 105° Faht. for at least 1/2 hour, to which 6 grms. chalk and 2 grms. phosphate of soda per liter liquor has been added. Then wash very carefully and dye without previously drying.

Dye with the necessary amount of dyestuff and the addition of 1. 5% acetate of lime 29° Tw. and 0. 1%—0. 2% tannic acid of the weight of the colour. Work for 1/4 hour cold, warm up to 160° Faht. within an hour, and dye at this temperature for 1/2—3/4 hour. Then wash the pieces in water as free as possible from lime, and oil again with a solution composed of 1 part Turkey red oil 50% in 9 parts water free from lime. Slop-pad once or twice, dry well and steam for 1 1/2—2 hours with 14—22 lbs. pressure.

After steaming boil for 1/2—1 hour at 185° Faht. or 1 hour with 7—14 lbs. pressure, in a solution containing

2—5 parts Olive oil soap
0.4 ,, soda and
0.15 ,, tin crystals

per 1000 parts water. Finally wash, and dry in the air. The previously oiled and steamed cotton material can also be slop-padded in an alum solution partly neutralized with soda. Allow the pieces to remain rolled up for one hour, dry on the racks, wash on the winch, dye with Alizarine Red (with the addition of a little stannic oxide paste and acetate of lime), wash, steam for 1 hour, soap slightly, wash and dry.

60. Colours adapted for the dyeing of cotton mordanted with alumina.

Red: Alizarine Red brands in paste (list: page 52)
Alizarine Purpurine 20%

Orange:	Alizarine Orange G, GG, R, RD in paste
Yellow:	Anthracene Yellow in paste
Green:	Coeruleine, S, SW
Blue:	Alizarine Sapphirole SE
	Celestine Blue B
	Gallamine Blue in paste
	Gallo Cyanine
Violet:	Alizarine Cyanine GG, R, R extra, 3R double in paste
	Alizarine Cyclamine R in paste
	Alizarine Heliotrope R in paste
Bordeaux:	Alizarine Bordeaux B, G, GG in paste
	Brilliant Alizarine Bordeaux R in paste
Brown:	Anthracene Brown G, R, W in paste
Black:	Alizarine Cyanine Black G in paste

Dyeing with Mordant colours on a chrome mordant.

1. Yarn Dyeing.

The scouring process is the same as that for yarn to be mordanted with alumina. It is not necessary to oil in this case.

Mordanting with chrome. Immerse the scoured yarn over night in a chloride of chrome solution 15—32° Tw., wring out and rinse. In place of the oiling process it is advantageous to treat with tannic acid or sumac (5 grms. tannic acid or 25 grms. sumac extract 20% per litre liquor). Chromium bisulphite 15—32° Tw. or chromium chromate 18° Tw. is sometimes employed in place of the chromium choride.

Dyeing. Dye for $^1/_2$ hour cold, increase the temperature slowly and dye for 1 hour at 140—195° Faht. (if necessary with the addition of a little acetic acid or acetate of ammonia or a little tannic acid), wash, dry, steam, then soap for 20 minutes at 120° Faht., wash and dry. If it is not desired to steam, fix the colour by boiling for 1—$1^1/_2$ hours.

2. Piece Dyeing.

Mordanting. Pad the piece in the Foulard with an alkaline solution of acetate of chrome (chrome padding 1) allow the padded material to remain rolled up for 6—8 hours, wash and then dye as stated below. — Another method is: Slop-pad with a chromium bisulphite solution (Chrome padding 2) either with or without a thickening agent, dry in the Hotflue, steam if necessary in the Mather-Platt or pass the goods previously or subsequently through alkaline baths (i. e. at 140° Faht. containing 3 grms. soda ash, si-

licate of soda, etc. per litre water) wash and dye as stated below.

Chrome padding 1. Slop-pad with 960 parts acetate of chrome 32° Tw., 2570 parts soda lye 67° Tw., 40 parts glycerine 48° Tw. and 6430 parts water.

Chrome padding 2. 6 litres chromium bisulphite 32 Tw., 12 litres mucilage of tragacanth 65:1000, 82 litres water.

Dyeing. Divide the mordant colours finely in water and add the solution to the dyebath through a sieve; then add about 2% acetic acid to the bath, enter the goods cold, bring the temperature from cold to the boiling point in ¾ hour, boil for ½—1 hour, wash well and run once through a soap bath, wash and dry; if necessary after-treat with chlorine.

61. Benzo colours adapted for the dyeing of cotton mordanted with chrome.

Bordeaux: Alizarine Bordeaux G, GG
Alizarine Purpurine 20%
Alizarine Red brands in paste (list below)
Brilliant Alizarine Bordeaux R in paste

Orange: Alizarine Yellow R
Diamond Orange in paste

Yellow: Alizarine Yellow GG in paste, 3G
Anthracene Yellow in paste, C
Chrome Yellow D, DF, G, R extra
Diamond Flavine G
Diamond Yellow G in paste

Green: Alizarine Viridine DG, FF
Brilliant Alizarine Viridine F in paste
Coeruleine, S, SW

Blue: Alizarine Blue BM, GG, GW, R, S, SR, SW
Alizarine Cyanine GG, R, R extra in paste
Alizarine Sapphirole SE
Brilliant Alizarine Blue G, R, SD (with an addition of Acetic Acid and Turkey Red Oil
Celestine Blue B
Delphine Blue
Gallamine Blue in paste
Gallo Cyanine

Violet: Alizarine Bordeaux B in paste
Alizarine Cyanine 3R double in paste
Alizarine Heliotrope R in paste
Chrome Violet in paste (with an addition of Acetate of Ammonia)
Galleine

Brown: Alizarine Orange G, GG, R, RD in paste

Anthracene Brown G, R, W in paste
Diamond Brown in paste
Black: Alizarine Blue Black B, 3B
Alizarine Cyanine Black G in paste
Alizarine Fast Grey SP, T

Alizarine Red brands arranged in order, from blue to yellow shade.

1B extra	1GG	SX extra
1A	IIGG	RIIIG
1 extra	GFX & GF	RA & RAG
1 extra new	WRB	RAB
IIAB	VB	IIIG
IIB	SX extra new	RS
IIA	V & RGV	VF & RIV
1RX	RVT	XB
IIAG	SX	VG
1G	RG	X
IIIAG	RAN	XG
IIAGG	RF & RFX	XGG

Dyeing with Mordant colours on an iron mordant.

Oil the yarn which has been scoured, washed and hydroextracted once or twice well in a mixture of 1 part Turkey Red oil 50% and 20 parts water, and dry at a temperature of 110° Faht. after each oiling. After this, work the goods for 1/4 hour in a ferric pyrolignite solution 1 1/2—3° Tw., then wring out well, level on the post and wash well.

When working with very calcareous water dye with the addition of a little acetic acid and Turkey Red oil (omit the acetic acid if the water does not contain much lime), commencing cold, bring the liquor to the boil and boil for 1 hour. Then wash and soap at 160° Faht. with 5 grms. soap per litre water.

62. Mordant colours which are suited for the dyeing of cotton mordanted with iron.

Alizarine Red 1B extra in paste
Alizarine Orange R in paste
Alizarine Blue S extra in paste
Alizarine Cyanine 3R double in paste
Anthracene Brown R in paste

63. Mordant colours fast to light.

(Al. = alumina, cr. = chrome.)

Red: Alizarine Red brands (al.)
Bordeaux: Alizarine Bordeaux brands (al.) (cr.)
Alizarine Red brands (cr.)
Brilliant Alizarine Bordeaux R (al.) (cr.)
Orange: Alizarine Yellow R (cr.)
Alizarine Orange brands (al.)
Yellow: Alizarine Yellow GG, 3G (cr.)
Anthracene Yellow in paste, C (cr.)
Diamond Flavine G (cr.)
Diamond Yellow G (cr.)
Green: Alizarine Viridine brands (cr.)
Brilliant Alizarine Viridine F (cr.)
Coeruleine brands (cr.)
Blue: Alizarine Blue brands (cr.)
Alizarine Cyanine R, R extra (cr.)
Alizarine Cyclamine R (cr.)
Alizarine Sapphirole SE (al.) (cr.)
Brilliant Alizarine Blue brands (cr.)
Celestine Blue B (cr)
Gallamine Blue in paste (cr.)
Violet: Alizarine Bordeaux B (cr.)
Alizarine Cyanine R, R extra (al.)
Alizarine Cyanine 3R double (al.) (cr.)
Alizarine Cyclamine R (al.)
Brown: Alizarine Orange brands (cr.)
Anthracene Brown brands (cr.)
Black: Alizarine Blue Black brands (cr.)
Alizarine Cyanine Black G (cr.)
Alizarine Fast Grey brands (cr.)

64. Mordant colours which are fast to alkali (resisting ammonia 20%).

The Alizarine and Mordant colours are fast to alkalies excepting the following:

Yellow: Chrome Yellow D, DF, R extra
Diamond Flavine G
Blue: Alizarine Sapphirole SE
Delphine Blue B
Violet: Chrome Violet in paste

65. Mordant colours which are fast to acetic acid 9° Tw.

All the Mordant colours are fast to acid excepting:

Orange: Alizarine Yellow R
Diamond Orange in paste

Yellow: Alizarine Yellow 3G
Chrome Yellow D, DF, G
Diamond Flavine G
Diamond Yellow G
Blue: Celestine Blue B

66. Mordant colours fast to washing.

Red: Alizarine Red brands (al.)
(The Blue brands are faster to washing that the Yellow.)
Bordeaux: Alizarine Bordeaux brands (al.) (cr.)
Alizarine Cyanine 3R double (al.)
Alizarine Red brands (cr.) (same as under red)
Brilliant Alizarine Bordeaux R (al.) (cr.)
Orange: Alizarine Orange brands (al.)
Yellow: Alizarine Yellow GG (cr.)
Green: Coeruleine brands (cr.)
Blue: Alizarine Blue brands (cr.)
Alizarine Cyanine GG, R, R extra (cr.)
Alizarine Cyclamine R (cr.)
Brilliant Alizarine Blue brands (cr.)
Violet: Alizarine Bordeaux B (cr.)
Alizarine Cyanine 3R double (cr.)
Galleine (cr.)
Brown: Alizarine Orange brands (cr.)
Anthracene Brown brands (cr.)
Black: Alizarine Blue Black brands (cr.)
Alizarine Cyanine Black G (cr.)
Alizarine Fast Grey brands (cr.)

67. Mordant colours fast to chlorine (resisting the effect of a chloride of lime lye 1° Tw. for 1 hour.)

Red: Alizarine Red brands (al.)
(The Blue brands are faster to chlorine than the Yellow.)
Bordeaux: Alizarine Bordeaux G, GG (al.) (cr.)
Alizarine Red brands (cr.) (same as under red)
Orange: Alizarine Orange brands (al.)
Blue: Alizarine Blue brands (cr.)
Brown: Alizarine Orange brands (cr.)

The dyeing of cotton in the vat with Alizarine Colours.

Directions for Dyeing.

Algole Blue CF Paste, Algole Blue 3G Paste, Algole Green B Paste. Add to the bath, which should be at 120° Faht.

$^3/_4$—1 pint Caustic Soda 52° Tw.

per 6 gallons dye-liquor. (It is necessary to add at least $^3/_4$ pint Caustic Soda also for light shades.) Then add according to the depth of shade required:

1—2 pints Hydrosulphite 27° Tw.

Stir up the colour with 5—10 times as much water, rub it through a coarse sieve into the dyebath, and bring it into solution by stirring well. Then enter the well wetted out yarn at 100° Faht., work for 10 minutes at the above temperature, raise the temperature of the bath to 140° Faht., in about $^1/_4$ hour, and continue dyeing for $^1/_2$—$^3/_4$ hour; the best results are obtained when the yarn is dyed immersed in the dye-liquor.

When dyeing with Algole Blue 3G Paste it is advisable to enter the yarn at 100° Faht.. and increase the temperature of the dye-liquor to 120° Faht. at the most.

After dyeing, wring the yarn out well, and rinse immediately. It is advantageous to add:

$^1/_8$—$^1/_4$ pint Hydrosulphite Solution 27° Tw.

per 25 gallons rinsing-liquor. After this acidulate in a cold bath with an addition of Sulphuric acid.

Algole Green B paste requires:

$^1/_4$ pint Sulphuric Acid 169° Tw.

and Algole Blue 3G paste:

2 pints Sulphuric Acid 169° Tw. per 25 gallons water. After acidulating, rinse well and soap warm or at the boil.

Special Directions for Algole Blue CF Paste.

This brand can also be dyed as follows:

According to the depth of shade required, add to the bath brought to 120° Faht.:

30—40 cc. caustic soda 53° Tw.
10—15 grms. dextrine or glucose
20—30 „ Glauber's salt
} per litre.

and the colour stirred up with the necessary quantity of water. Enter the well wetted goods, raise the temperature to the boil within $^1/_2$ hour whilst working the yarn well, and allow to boil gently for a further $^1/_2$ to $^3/_4$ hour. Then wring out, rinse at once and work as stated above for the hydrosulphite method.

Algole Red B paste.

This brand is dyed cold, but better results are obtained when the temperature is raised to 120° Faht.

Add to the bath, which should not be more than 80° Faht.,

$^3/_4$ pint Caustic Soda 52° Tw.

per 6 gallons dye-liquor. Then add, according to the depth of shade required:

1—2 pints Hydrosulphite of Soda 27° Tw.

Stir up the colour into a thin paste with 5—10 times as much water, rub it through a coarse sieve into the dyebath, and bring it into solution by stirring well. Then add per 6 gallons dye-liquor:

$2^1/_2$—$3^3/_4$ lbs. Glauber's Salt

and rake thoroughly. Then enter the well wetted out yarn, and work for 1 hour at the temperature named, best on bent sticks for the most level results. After dyeing, wring out a stick at a time for light shades, and rinse immediately; but for dark shades, after wringing, air off $^3/_4$ of an hour and then wash. After this rinse in a fresh bath, to which $^1/_4$—$^1/_2$ pint sulphuric acid 169° Tw. per 25 gallons water has been added; rinse again in water, and soap at the boil.

When dyeing in machines, where short liquors are used, the Glauber's salt may be omitted.

The following tables will enable you to ascertain at a glance, the additions necessary for certain ratios of liquor.

Volume of Dye-liquor 20:1 of Goods.
For 100 lbs. of yarn.

Algole Red B Paste.	Caustic Soda 52° Tw.	Hydrosulphite of Soda 27° Tw.
	pints	gallons
1— 5%	$18^3/_4$	$6^1/_2$
10%	$18^3/_4$	$6^1/_2$
20%	$18^3/_4$	8
Volume of Dye-liquor 25:1 of goods		
1— 5%	$18^3/_4$	$6^1/_2$
10%	$18^3/_4$	$6^1/_2$
20%	$18^3/_4$	8
Volume of Dye-liquor 30:1 of goods		
1— 5%	$18^3/_4$	$6^1/_2$
10%	$18^3/_4$	$6^1/_2$
20%	$18^3/_4$	8

The Preparation of Hydrosulphite 27° Tw.

To prepare hydrosulphite 27° Tw. add slowly 13 lbs. Zinc Powder to 10 gallons bisulphite of soda 72—78° Tw. Whilst adding the zinc powder to the bisulphite, the tem-

perature of the solution should not rise above 100° Faht., and it is therefore advisable to cool down with ice. After adding the zinc powder, stir well for $^1/_2$ hour, then allow to stand for 1 hour and filter the solution through a piece of calico. To this solution add milk of lime, which is preparad by slacking 1 lb. of quick lime in $3^1{}_{,2}$ pints of water, and then stir well. After allowing to stand for two hours, filter this solution, and then add $^1/_4$ gill soda lye 76° Tw. per gallon liquor. The hydrosulphite solution thus obtained is then made up with water to 27° Tw.

Solutions of hydrosulphite must be stored in a cool place and employed as quickly as possible, as they remain stable only a few days.

68. Alizarine colours employed for dyeing cotton in the vat.

Red: Algole Red B in paste
Green: Algole Green B in paste
Blue: Algole Blue CF in paste, 3G in paste

These colours are fast to light, alkali, acid, washing and boiling.

Algole Red B paste is excellently fast to chlorine.

Algole Blue CF is fairly fast to chlorine.

Algole Blue 3G will probably meet the demands made by Laundries as regards fastness to chlorine; in the washing or in the presence of alkalies the shade alters a little. It is therefore advisable to afterwards run the dyed goods through a weak acid bath, whereby the original shade is restored.

Paranitraniline Red.

Preparation of the Yarn. The mordanting with Beta Naphtol can only be done cold or at most lukewarm (not above 100° Faht.), and it is therefore absolutely necessary to boil off the yarn previously with caustic soda and silicate of soda or soda ash, to rinse and dry, in order to ensure a uniform impregnation; in very few cases indeed will an ordinary wetting out with hot water be sufficient, and it is also not advisable to mordant yarn still damp from the scouring process, as the mordanting liquor is thereby diluted and the penetration of the goods is rendered more difficult. Scoured and bleached yarn is used for better class goods.

Mordanting with Beta Naphtol. It is best to employ ground Beta Naphtol (or Naphtol AR) that has been brought to a paste with the prescribed quantity of caustic soda, and which with the addition of hot water is easily dissolved by stirring. This solution must be prepared

freshly every time, as the alkaline Naphtol solution when exposed to the air for some time, turns brown, and saddens the resulting shade. To facilitate a uniform penetration, Turkey red oil is also added, and to improve the bluish tone and cause the mordant to fix better during the drying, it is advisable to add besides, aluminate of soda, which should be in solution. The mordant liquid should be brought to a certain volume depending on the quantity of yarn to be mordanted. For example, for 100 lbs. yarn this amounts, according to the method of working, to about 12 gallons, as, in economical working, this amount of liquor is completely absorbed by the 100 lbs. of yarn. Some dyers are accustomed to substitute diluted dextrine, potato starch, or lime solutions for a portion of the water used for replenishing the bath, in order to increase the levelness of the red. The penetrating property of the mordant liquor is also aided by a moderate increase in the temperature. For the mordanting process a vessel should be employed prepared with, for example, 3—5 gallons Naphtol solution. It is best to mordant the yarn in two lb. bundles; for every bundle yarn add about 2 pints mordant liquor, so that about 12 gallons are required for 100 lbs. of yarn. Wring out uniformly after mordanting.

For these directions keep the temperature at an average temperature of about 100° Faht.

Drying. As every drop of water and every finger mark with wet hands weakens the Naphtol mordant in the places touched, whereby bright red or yellow spots arise later, great care must be taken in conveying the yarn to the drying chamber, as it is only after the yarn is dry that the Naphtol mordant has resistance to a certain extent, which alone renders the complete formation of the Paranitraniline Red possible on the cotton fibre; on the other hand, when dried at too high a temperature, or for too long a time, the sodium salt of Beta Naphtol on the fibre has the tendency to dissociate into volatile Beta Naphtol and soda, so that it is necessary not to dry beyond a certain temperature or time. When drying in the chamber in the ordinary way at a temperature of 120—130° Faht., turning the yarn often, 4—5 hours are required, but when drying on the rotating winch at the same temperature, it takes only about 2—$2^1/_2$ hours.

Further manipulation. The mordanted yarn is worked up as soon as it is dry, as when exposed to the action of the air for a long time it turns brown and the resulting red is dull. The hands of the men working in the alkaline Naphtol solution should be protected with india-rubber gloves.

Diazotising. The conversion of Paranitraniline, by means of sodium nitrite and hydrochloric acid, into the perfectly soluble diazo compound requires some practice and can only be attained by carefully observing the following points:

1. The Paranitraniline must first be stirred up into a paste with sufficient acid, then allowed to stand for a few minutes and afterwards brought into a perfect solution with hot to boiling water.

2. This clear, hot solution is poured in a fine stream into cold water while stirring quickly all the time, so that the precipitate formed is as finely divided as possible. The finer and more uniform this precipitate, the quicker and more complete is the action of the sodium nitrite later on.

3. The lower the temperature when adding the nitrite, the clearer and more stable will be the diazo solution. The use of ice before adding the nitrite will only be found necessary on hot summer days; as a rule cold spring water is quite sufficient, as long as the proportions of the hot Hydrochloride Paranitraniline solution and cold water are such that after mixing, the temperature is not more than about 50 Faht. To a certain extent the higher temperature of this solution can be counteracted by an increased addition of acid, i. e. the greater the quantity of Hydrochloric acid added in diazotising, the clearer and more stable will be the solution. It must, however, be remembered, that an excess of acid must be neutralised by a correspondingly larger amount of acetate of soda and soda.

4. The nitrite of soda which must be in a concentrated solution is added in a good stream and should be poured in quickly while constantly stirring. Even if ice is used, it is scarcely possible to prevent the diazo solution becoming turbid if the nitrite is added slowly. The diazotising is only complete if 10—15 minutes after the nitrite has been added, nitrous acid is still traceable in the bath. This is ascertained by means of potassium iodide starch paper which should turn bluish black. Should the Diazo solution not be for immediate use, it must then be preserved in the state in which it is after the nitrite has been added, as it is far less stable after the acetate of soda and soda have been added. If ice is not to be had, it is even advisable in summer to neutralize each time only the quantity necessary for immediate use.

5. The hydrochloride diazo solution which results from the addition of nitrite is unsuitable for developing Paranitraniline Red. The proper development takes place only if the solution is neutral or if it contains free acetic acid exclusively. An excess of acetates does no harm, but even

the slightest amount of hydrochloric acid that has not been neutralised will easily affect the resultant shade. In the special recipes the quantities of acetate of soda and soda are so calculated that the solution remains slightly acidulated with acetic acid. We rather disapprove of the use of caustic soda which is frequently employed for neutralising the Diazo solution, because the yellowish and duller red thus obtained, is not very well liked. Of course one can neutralise with acetate of soda alone if this is not found too expensive. The yellowish brown froth that rises to the surface of the liquor when neutralising should be skimmed off, or when at a higher temperature a heavier precipitate is formed, the whole of the liquor should be strained through a course piece of muslin; finally the Diazo solution for 100 lbs. of yarn, should be made up to about 12 gallons, same as when mordanting.

Developing on the fibre. The developing of the yarn which has previously been treated with Naphtol solution, dried and cooled, is carried out in the same way as described for the Naphtol treatment. In contradistinction to the mechanical impregnation in mordanting, however, a chemical conversion of the Diazo compound and the sodium salt of Beta Naphtol present on the fibre takes place very quickly; in order to produce a shade of uniform depth, it is therefore necessary to dilute with water in preparing the standard liquor, and for every 2 lb. bundle of yarn add, same as when mordanting, about 2 pints.

Final treatment of the dyed yarn. The yarn which has been turned once or twice in the Diazo liquor and afterwards wrung out well, without allowing it to remain in a heap for a long time, is first rinsed in cold water, then rinsed or soaped at 120—195° Faht., and finally rinsed again, hydroextracted and dried.

Warm rinsing or soaping, as the case may be, has a considerable effect on the bluish tone and on the fastness to rubbing of the Red; when rinsed at 120—140° Faht, a slightly bluish, bright Red shade is obtained, but when rinsed at 195—212° Faht. and soaped for a considerable time, the Red has a more pronounced bluish shade but is less bright in tone. As is of course quite natural, when unbleached yarn is employed, the more or less dull yellowish bottom affects the Paranitraniline Red; in order to improve the brightness in such cases, the yarn is subsequently treated in a solution of chloride of lime 1° Tw., being turned in this solution 7 or 8 times. The fastness to rubbing is not only dependant on the more or less thorough soaping after the developing, but more particularly on the good, uniform fixation of the Naphtol mordant

and on the employing of a clear weakly acidulated (acetic acid) Diazo solution (not however a solution containing mineral acids or alkali).

Examples.

Medium Red for 100 lbs. yarn.

Bottoming with Beta Naphtol.

Dissolve

2 lbs. Beta Naphtol in
2 lbs. caustic soda 65—75° Tw. and
4 gallons boiling water; then add to this solution
6 pts. Turkey Red oil 55% and
$1^2/_5$ lbs. aluminate of soda previously dissolved in $1^2/_5$ gallons water.

The whole quantity, according to the quality of the yarn, is then made up to 12—14 gallons. For the production of a bluish shade of Paranitraniline Red take 2 lbs Naphtol AR instead of 2 lbs. Beta Naphtol. Monopole Soap can also be used instead of Turkey Red oil.

Developing with Diazo solution.

Stir up well

$1^1/_2$ lbs. Paranitraniline in
4 lbs. hydrochloric acid 32° Tw. and after a few minutes stir in
$^3/_4$ gallon boiling water.

This solution must not be allowed to cool down, but should be poured straight away in a thin stream and whilst stirring well into 8 gallons of water, as cold as possible; after this pour in a solution of

$^4/_5$ lb. sodium nitrite dissolved in $^4/_5$ gallon cold water

quickly and in a heavy stream, also whilst stirring well.

If the solution should appear very turbid, it can be attributed either to the temperature having been too high, or the addition of the nitrite solution not having been made quickly enough, or to an insufficient amount of nitrite or acid. Just before using, the hydrochloric acid Diazo solution is neutralised with the following solution:

$^4/_5$ lb. soda ash ($2^2/_5$ lbs. soda cryst.) in
2 pints hot water; then add
$1^1/_2$ lbs. acetate of soda cryst. dissolved in
$1^3/_5$ gallons water, or
$3^2/_5$ lbs. acetate of soda alone, dissolved in
1 gallon water.

The Diazo solution thus neutralised should not in the least turn red Congo paper blue, but blue litmus paper should turn slightly red. The Diazo solution is finally made up to 12—14 gallons.

Deep Red. (for 100 lbs. Yarn).

(Directions for working see under "Medium Red".)

Bottoming with Beta Naphtol

Dissolve

3 lbs. Beta Naphtol (or Naphtol AR for Paranitraniline bluish shade),
3 lbs. soda lye 65—75° Tw. in
4 gallons hot water; then add
$^4/_5$ gallon Turkey Red oil and
2 lbs aluminate of soda previously dissolved in
2 gallons water, make up to about 12—14 gallons,

Developing with Diazo solution

Stir up

$2^1/_4$ lbs. Paranitraniline with
$^3/_5$ gallon hydrochloric acid 32—34° Tw. and dissolve by boiling with
$7^1/_5$ pints water, then pour same into
8 gallons cold water.

Dissolve

$1^1/_5$ lbs. sodium nitrite in
1 gallon cold water.

Dissolve

$1^1/_5$ lbs. soda ash ($3^3/_5$ lbs. soda cryst.) in
$3^1/_5$ pts. hot water; add to this solution
$2^1/_5$ lbs. acetate of soda cryst, dissolved in
1 gallon cold water, or
5 lbs. acetate of soda alone, dissolved in
1 gallon water

Make up to about 14 gallons.

Wool Dyeing.

Scouring.

Loose Wool. All kinds of wool contain more or less fatty matter, as well as dust, dirt and other impurities, so that it is absolutely necessary to scour same thoroughly before dyeing, as the wool must be quite clean in order to get good level shades. If the fat is not sufficiently removed by the scouring process, the colours fall on unevenly and are not so fast.

To clean the wool it is first soaked in water, then scoured with soda, soap or ammonia, and thoroughly rinsed with clean water as cold as possible. The strength of the scouring bath—the temperature of which should not exceed 110° Faht.—and the duration of soaking depends upon the amount of impurity contained in the wool. Water as soft as possible should be employed for the process, since hard (calcareous) water causes the formation of lime soap, which smears the goods, and entails much trouble in dyeing.

Woollen yarn. Most woollen yarn contains oil from the spinning process, which, together with other possible impurities adhering to the yarn from the various treatments, transport, etc. must be removed by scouring.

a) Worsted yarn is on the average cleaner than knitting yarn, and it often suffices to scald same with boiling water, especially if the yarn is only to be dyed in dark shades. The yarn is piled up in a clean kier in bundles as received from the spinning mill, or in a plaited form, and scalded by pouring over boiling water as soft as possible, after which it is left lying in the kier for several hours or better over night. Sometimes a stretching apparatus is employed, the yarn being stretched between sticks and steeped in boiling hot water. Yarn scalded in this manner does not shrink together in the dyeing. This process is especially employed for weft yarns.

The washing of the worsted yarn is carried out at a temperature of about 100—110° Faht, with the addition of soap, soda, and if necessary ammonia.

After washing, rinse well, but in order to remove all traces of soap it is advisable to first rinse in a lukewarm bath containing as much ammonia as is necessary to give it a slight odour.

b) Knitting yarn. It is best to scour yarns containing a large amount of fatty matter, in two baths, adding to the first soda, soap, and ammonia, and to the second only soda or ammonia, if necessary. After this the goods are rinsed in the same way as stated for worsted yarn.

Woollen fabrics. The goods are scoured with an addition of soda and soap after they come from the loom, to remove the mill oil and size. Then follows the milling process which varies according to the quality of the goods, and subsequently washing with an addition of soda and soap. It is often advisable afterwards to rinse with an addition of ammonia in order to remove all traces of soap.

Bleaching.

The oldest method consists in bleaching the wool with sulphur and is carried out in the so-called stoving-chambers, in which loose wool is spread out on hurdles, yarn and pieces on sticks. The wool material must be brought into the stoving-chamber in a damp state and must be allowed to remain there for 6—8 hours or better over night; for 100 lbs. goods take, according to the size of the chamber, 3—6 lbs. roll-brimstone. In order that the sulphur may burn easily, and to avoid a sublimation, a sufficient current of air must be provided for in the chamber.

Rinse the goods very well in water after stoving and hang up, in order to get rid of the smell.

To obtain a "pure white" the wool is blued in a fatty soap bath with Indigo Extract and Methyl Violet, etc., well hydroextracted and then brought into the chamber. As, however, the colours mentioned are not at all fast to light, Alizarine Irisole R, Alizarine Sky Blue B and Alizarine Astrole B, which are excellently fast to light, have been employed lately with great success, as they produce a fine and permanent white when used in the proper proportions.

Instead of stoving in the chamber, the wool—especially loose wool—is also treated in solutions of sulphurous acid or in such of sodium bisulphite and mineral acids.

Bleaching is furthermore done with peroxide of hydrogen by adding 6 gallons peroxide of hydrogen techn. to 14 gallons water and making the bath slightly alkaline with 3 pints silicate of soda (or ammonia). Then warm up to 100—120° Faht., enter the wool, and allow it to lie

over night in the liquor. It is advisable to keep the vessel covered, and to use one that is made of wood without metal parts. Water containing iron is unsuitable.

After bleaching, acidulate the wool in a fresh, cold bath with 2—5% sulphuric acid (of the weight of the material) and rinse in clean water.

To obtain a very fine white, fast to light, the before mentioned Alizarine colours can be added to the acid bath for the purpose of bluing the wool.

Bleaching with sodium peroxide. Add to the Bleaching bath 30% sulphate of magnesia (Epsom's salts) of the weight of the goods, enter at about 85° Faht., work for a few minutes, lift out, add 10% sodium peroxide very slowly, enter again, warm up in ½ hour to 120—140° Faht. and allow the wool to lie in the bath for 1½—3 hours. After this rinse the goods in a bath acidulated with sulphuric acid and finally wash well with water.

Acid dyeing Wool Colours.

Directions for dyeing. Dye with an addition of 10—15% Glauber's salt cryst. and 2—5% sulphuric acid 168° Tw. or 5—15% bisulphate of soda. The level dyeing colours even allow of shading mode shades in the boiling bath.

The Rhodamines are dyed with an addition of 5% Glauber's salt and 1 · 5% sulphuric acid, or 5% acetic acid or with 5% bisulphate of soda. They produce the clearest shades when dyed at a temperature of about 200° Faht.

The Eosines are dyed near the boil with an addition of 5% acetic acid. Very pure shades are also obtained by first boiling the material to be dyed with 5% alum, 5% tartar and 5% acetic acid for ½ hour, then allowing the bath to cool down to 100° Faht., adding the dyestuff and dyeing for ¼ hour under the boil and then boiling for ¼ hour. The material, however, is rendered considerably harder when dyed according to the latter process.

69. List of acid dyeing Wool Colours.

Those dyeing easily level are marked *

Red:
*Alizarine Rubinole R
Azo Cochineal
Azo Eosine
*Azo Fuchsine B, 6B, G, S
*Azo Crimson L, S
*Azo Phloxine 2G
Bordeaux BX, extra, G
Brilliant Croceine 3B

Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R
Carmoisine B, 3B
Cochineal Scarlet PS
Croceine Scarlet 1B—3B, 5B, 7B—10B, 1BX —3BX, R, RX
Double Ponceau 1R—4R
Fast Red A, BT, E, NS
*Fast Acid Magenta B
Eosine I bluish, I yellowish, S extra bluish S extra yellowish.
Crystal Ponceau 6R
Metanil Red 3B, 3B extra
New Red 3R, 5R
Orseilline BB
Ponceau 1R—3R, 2RL
Rhodamine B, B extra, G, G extra
*Acid Magenta
Scarlet R
Imperial Scarlet 1B, 3B
Cloth Red B, 3B extra, G, 3G extra

Orange: *Croceine Orange G, R
*Fast Light Orange G
Golden Orange
*Mandarine G
Orange IIB*, IV. GT, RO*

Yellow: *Quinoline Yellow, extra
*Fast Yellow extra
*Fast Light Yellow G, 2G, 3G
Golden Yellow
*Indian Yellow G, GR, R
Metanil Yellow, extra, conc.
*Naphtole Yellow S, SE
Naphtylamine Yellow
New Yellow extra
*Tartrazine

Green: Alizarine Emeraldole G
*Alkali Fast Green 3B, 3G
*Brilliant Acid Green 6B
Fast Green, extra, bluish*, extra bluish*, CR
*Fast Light Green
Cashmere Green B
*Parrot Green,
*Acid Green, extra, BB extra, 3B, BBN extra, GB extra, GG extra
*Wool Green BS

Blue: *Alizarine Astrole B, G
Alizarine Sky Blue B

*Alizarine Sapphirole B, SE
*Anthra Cyanine BL, DL, FL, 3FL
Brilliant Alizarine Cyanine 3G
Brilliant Blue extra greenish
*Brilliant Wool Blue B extra, G extra
*Fast Acid Blue B, B extra
*Intensive Blue B
Cashmere Blue TG extra
Night Blue extra greenish
*New Patent Blue B, 4B, GA
Red Blue extra conc.
Victoria Navy Blue B, DK
Soluble Blue 3B extra greenish, greenish I, reddish I, TRG
Wool Blue N extra, R extra, SR extra
Wool Fast Blue BL, GL, RL

Violet: *Alizarine Irisole R
Alkali Violet LR, R
*Azo Acid Violet A2B, AL, B extra, R extra, 4R
*Fast Acid Violet 10B
Acid Violet 4B extra, 5B, 7B, 8B extra, 4BN extra*, 6BN, 6BN extra*, 6BNB*, BW*, HW, R extra, 3R, 4RS*
*Victoria Violet 4BS

Brown: Cashmere Brown V

Black: *Cashmere Black B, 6B, 3BN, 3BX, T, TN (dyed as black they work very level)
Naphtaline Acid Black 4B
Naphtole Black 2B
Naphtylamine Black 4AN, 4B, 6B, 10B, 4BK, 4BN, 6BN, S
Brilliant Hat Black B
New Victoria Black B
Phenylamine Black 4B, T
Phenyl Blue Black N
Acid Black 5B, 4BL, LD
Victoria Black B
Wool Black B, N4B

70. The fastest to light of the acid dyeing Wool Colours.

Red: Alizarine Rubinole R
Azo Cochineal
Azo Eosine
Azo Fuchsine B, G, S
Azo Crimson S
Azo Phloxine 2G
Bordeaux BX

Brilliant Ponceau 4R, 5R
Carmoisine B, 3B
Cochineal Scarlet PS
Croceine Scarlet 1B—9B, R
Double Ponceau R
Fast Red BT, NS
Metanil Red 3B, 3B extra
New Red 3R, 5R

Orange: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB

Yellow: Fast Yellow extra
Fast Light Yellow G, 2G, 3G
Tartrazine

Green: Alizarine Emeraldole G
Fast Light Green
Wool Green BS

Blue: Alizarine Astrole B, G
Alizarine Sky Blue B
Alizarine Sapphirole B, SE
Anthracyanine BL, DL, FL, 3FL
Brilliant Alizarine Cyanine 3G
Cashmere Blue TG extra
Wool Fast Blue BL, GL, RL

Violet: Alizarine Irisole R
Azo Acid Violet A2B, AL, B extra, R extra

Black: Cashmere Black B, 6B, 3BN, 3BX, T, TN
Naphtole Black 2B
Naphtylamine Black 4AN, 10B
Brilliant Hat Black B
New Victoria Black B
Phenyl Blue Black N
Acid Black 4BL, LD
Victoria Black B
Wool Black B

71. Acid dyeing Wool Colours relatively fast to washing or milling.

Red: Alizarine Rubinole R
Azo Fuchsine 6B
Eosine I bluish, I yellowish, S extra bluish, S extra yellowish
Rhodamine B, B extra, G, G extra
Cloth Red 3B extra

Yellow: Quinoline Yellow, extra
Tartrazine

Green: Alizarine Emeraldole G
Alkali Fast Green 3B, 3G
Brilliant Acid Green 6B
Cashmere Green B

Blue: Alizarine Astrole B, G
Alizarine Sky Blue B
Alizarine Sapphirole B, SE
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B, B extra
Intensive Blue B
Victoria Navy Blue B, DK
Wool Blue N extra
Wool Fast Blue BL, GL

Violet: Alkali Violet LR, R
Acid Violet 4B extra, 5B, 4BN extra, 6BN, 6BN extra, 6BNB, BW, HW, R extra, 3R
Victoria Violet 4BS

Brown: Cashmere Brown V

Black: Naphtaline Acid Black 4B
Naphtole Black 2B
Naphtylamine Black 4B, 6B, 4BN, 6BN
Phenylamine Black 4B, T
Phenyl Blue Black N
Acid Black 5B, LD
Victoria Black B
Wool Black B, N4B

72. Acid Wool Colours, relatively fast to water.

Red: Alizarine Rubinole B
Azo Cochineal
Azo Fuchsine B, 6B, G, S
Azo Crimson L, S
Azo Phloxine 2G
Bordeaux G
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 5R
Carmoisine B, 3B
Cochineal Scarlet PS
Croceine Scarlet 5B, 7B—10B
Fast Red E, NS
Eosine I bluish, I yellowish, S extra bluish
Orseilline BB
Ponceau 2RL, 3R
Rhodamine B, B extra, G, G extra
Imperial Scarlet 3B
Cloth Red 3B extra

Yellow: Fast Light Yellow 2G, 3G
Green: Alizarine Emeraldole G
Alkali Fast Green 3B, 3G
Fast Green, extra
Cashmere Green B
Acid Green extra, GB extra
Blue: Alizarine Sky Blue B
Alizarine Sapphirole B, SE
Cashmere Blue TG extra
Soluble Blue 3B extra greenish, greenish I, reddish I, TRG
Wool Fast Blue BL, GL
Violet: Acid Violet 5B, 7B, 6BN, 6BN extra, 6BNB, BW, R extra, 3R
Victoria Violet 4BS
Brown: Cashmere Brown V
Black: Cashmere Black B, 6B, 3BN
Naphtaline Acid Black 4B
Naphtole Black 2B
Naphtylamine Black 4AN, 4B, 6B, 4BK, 4BN, 6BN
Brilliant Hat Black B
Phenylamine Black 4B
Phenyl Blue Black N
Acid Black LD
Victoria Black B
Wool Black B, N4B

73. Acid Wool Colours, fast to stoving.

Red: Azo Cochineal
Azo Fuchsine B, 6B, G, S
Azo Crimson L, S
Azo Phloxine 2G
Bordeaux BX, extra, G
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R
Carmoisine B, 3B
Cochineal Scarlet PS
Double Ponceau 1R—4R
Fast Red A, BT
Fast Acid Magenta B
Eosine I bluish, I yellowish. S extra bluish, S extra yellowish
Crystal Ponceau 6R
Orseilline BB
Ponceau 2RL
Rhodamine B, B extra, G, G extra

Imperial Scarlet R
Cloth Red B, 3B extra, G, 3G extra

Orange: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB, GT, RO

Yellow: Quinoline Yellow, extra
Fast Light Yellow G, 2G, 3G
Golden Yellow
Indian Yellow GR, R
Naphtol Yellow S, SE
Tartrazine

Green: Alizarine Emeraldole G
Alkali Fast Green 3B, 3G
Brilliant Acid Green 6B
Fast Green bluish, extra bluish
Cashmere Green B
Wool Green BS

Blue: Alizarine Astrole B, G
Alizarine Sky Blue B
Alizarine Sapphirole B, SE
Anthracyanine BL, DL, FL, 3FL
Brilliant Alizarine Cyanine 3G
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B. B extra
Cashmere Blue TG extra
New Patent Blue B, 4B, GA
Victoria Navy Blue B, DK
Wool Blue N extra, R extra, SR extra
Wool Fast Blue BL, GL, RL

Violet: Alizarine Irisole R
Alkali Violet LR, R
Azo Acid Violet A2B, AL, B extra, R extra, 4R
Fast Acid Violet 10B
Acid Violet 4B extra, 5B, 8B extra, 4BN extra, 6BN, 6BN extra, 6BNB, BW, HW, R extra, 3R, 4RS

Brown: Cashmere Brown V

Black: Cashmere Black B, 6B, 3BN, 3BX, T, TN
Naphtylamine Black 4AN, 10B, 4BN, 6BN, S
Brilliant Hat Black B
New Victoria Black B
Phenylamine Black 4B, T
Acid Black 5B, 4BL
Victoria Black B
Wool Black B, N4B

74. Acid Wool Colours, fast to ammonia 20 %.

Red:
Azo Cochineal
Azo Fuchsine S
Azo Crimson L, S
Bordeaux BX, extra, G
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R
Carmoisine B
Cochineal Scarlet PS
Croceine Scarlet 1B—3B, 5B, 7B—9B, 1BX, 2BX, 3BX, R, RX
Double Ponceau 1R—4R
Fast Red A, BT, E
Fast Acid Magenta B
Eosine I bluish, I yellowish, S extra bluish, S extra yellowish
Crystal Ponceau 6R
Metanil Red 3B, 3B extra
Ponceau 1R, 2R, 2RL, 3R
Rhodamine B, B extra, G, G extra
Cloth Red 3B extra, 3G extra
Scarlet R
Imperial Scarlet 1B, 3B,

Orange:
Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB, GT, RO

Yellow:
Quinoline Yellow, extra
Fast Yellow extra
Golden Yellow
Indian Yellow GR, R
Metanil Yellow. extra, conc.
Naphtole Yellow S, SE
Naphtylamine Yellow
New Yellow extra conc.
Tartrazine

Green:
Alizarine Emeraldole G
Alkali Fast Green 3B, 3G
Fast Green extra bluish
Cashmere Green B

Blue:
Alizarine Astrole B, G
Alizarine Sky Blue B
Alizarine Sapphirole SE
Anthracyanine BL, DL
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B extra

Cashmere Blue TG extra
New Patent Blue B, 4B, GA
Wool Fast Blue BL, GL

Violet: Alkali Violet LR, R
Azo Acid Violet A2B, AL
Fast Acid Violet 10B
Acid Violet 8B extra, 4BN extra

Brown: Cashmere Brown V

Black: Cashmere Black B, 6B, 3BN, T, TN
Naphtaline Acid Black 4B
Naphtole Black 2B
Naphtylamine Black 4AN, 4B, 6B, 10B, 4BK, 4BN, 6BN, S
Brilliant Hat Black B
New Victoria Black B
Phenylamine Black 4B, T
Phenyl Blue Black N
Acid Black 5B, 4BL, LD
Victoria Black B
Wool Black B, N4B

Carbonizing.

a) Loose Wool.

Before carbonizing, the wool should be carefully freed from grease, then rinsed well. Sulphuric acid 6—8° Tw. (1,029—1,045 spec. grav.) is used for acidulating, in which the wool should lie for 2—3 hours and be frequently turned. It is then allowed to drain, hydroextracted in a hydro-extractor lined with lead, or pressed through rollers. The wool is first of all dried in the stove at 120° Faht.; the temperature is then raised to 195—215° Faht., in order to destroy the cotton and other vegetable fibres.

After carbonizing, rinse with water and, if it is necessary to free the goods from acid, neutralize afterwards in a soda solution of 5—8° Tw. (1,022—1,037 spec. grav.) and then rinse well.

b) Woollen fabrics.

Wash the material well previously and rinse in clean water. The carbonization can be carried out with

1. Sulphuric acid 6—9° Tw. (1,029—1,045 spec. grav.) or
2. Aluminium Chloride 9—12° Tw. (1,045—1,060 spec. grav.) or
3. Magnesium chloride 15° Tw. (1,075 spec. grav.)

The goods are impregnated with sulpuric acid in a vessel with a winch being allowed to run for 1—2 hours. Recipe 2 and 3 should only be done in the washing machine or in the rinsing basin, as the somewhat fatty substance penetrates the material only with difficulty; allow the wet woollen material to run for 20—25 minutes and then hydroextract well. In case only copper hydroextractors are at disposal, same should be lined with a piece of cloth. After hydroextracting, the pieces are folded again and covered up, so as to prevent the edges from drying and producing light stripes afterwards. The goods should now be dried as quickly as possible in the carbonizing stove or in the drying machine.

After carbonizing, free the goods from acid by rinsing in cold water for 20—30 minutes and then neutralize in a soda solution, same as prescribed for loose wool, after which wash well. The goods are after the so-called burning process is completed sometimes also treated in an old cylinder milling machine and allowed to run for a short time in the dry state, in order to remove the dust caused by the carbonization. It is best to wash out the goods with Fuller's earth when carbonizing with aluminium chloride, so as to get rid of the alumina settled in the wool. If the cotton lists are to remain unaffected, brush on silicate of soda 15° Tw., or soda and chalk. Silicate of soda dries very quickly, and only adheres to the parts treated, without running into the material.

75. Acid Colours fast to carbonizing.

(After carbonizing, the shades were neutralized with soda.)

Red:
Alizarine Rubinole R
Azo Cochineal
Azo Fuchsine 6B, G
Azo Crimson S
Azo Phloxine 2G
Bordeaux BX, G
Brilliant Double Scarlet 3R
Carmoisine B
Cochineal Scarlet PS
Croceine Scarlet 2B, 3B, 7B, R, RX
Double Ponceau 1R—4R
Fast Red A, E, NS
Crystal Ponceau 6R
Ponceau 1R, 2R, 2RL, 3R
Rhodamine B, B extra, G, G extra
Imperial Scarlet 1B
Scarlet R

Orange: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB, GT, RO

Yellow: Quinoline Yellow, extra
Fast Yellow extra
Fast Light Yellow G, 2G, 3G
Indian Yellow G, GR, R
Metanil Yellow, extra, conc.
Naphtole Yellow S, SE
Naphtylamine Yellow
New Yellow extra conc.
Tartrazine

Green: Alizarine Emeraldole G
Alkali Fast Green 3B, 3G
Brilliant Acid Green 6B
Fast Green, bluish, extra, extra bluish, CR
Fast Light Green
Acid Green extra, BB extra, 3B, BBN extra, GB extra. GG extra
Wool Green BS

Blue: Alizarine Astrole B, G
Alizarine Sapphirole B, SE
Anthracyanine BL, DL, FL, 3FL
Brilliant Alizarine Cyanine 3G
Brilliant Blue extra greenish
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B extra
Cashmere Blue TG extra
New Patent Blue B, 4B, GA
Red Blue extra conc.
Victoria Navy Blue DK
Soluble Blue 3B extra greenish, greenish I, reddish I, TRG
Wool Blue R extra, SR extra
Wool Fast Blue BL, GL, RL

Violet: Alizarine Irisole R
Alkali Violet R
Azo Acid Violet A2B, AL, B extra
Acid Violet 7B, 4BN extra, 6BN, 6BNB, BW, HW, R extra, 3R
Victoria Violet 4BS

Brown: Cashmere Brown V

Black: Cashmere Black B, 6B, 3BN, 3BX, T, TN
Naphtaline Acid Black 4B
Naphtole Black 2B
Naphtylamine Black 4AN, 4B, 6B, 10B, 4BK, 4BN, 6BN, S

Brilliant Hat Black B
New Victoria Black B
Phenylamine Black 4B, T
Phenyl Blue Black N
Acid Black 5B, 4BL, LD
Victoria Black B
Wool Black B, N4B

Singeing, crabbing, and steaming of woollen material.

Singeing is the first operation to which nearly every plain woollen fabric is subjected. The object of this is to remove all the fibres or hairs projecting above the surface of the material. The singeing is carried out by means of the plate singeing or gas machine.

Crabbing. After singeing, most woollen materials are crabbed. The crabbing process is in the first place applied to cause a setting of the fabric in such a manner that it does not cockle or break in the subsequent operations such as washing, dyeing, etc. and in addition, the crabbing imparts to the fabric a fine permanent lustre which is not destroyed by subsequent manipulations. The process of crabbing consists in rolling the material full width on a beam which revolves in warm or almost boiling water. The beaming of the material is done either with or without pressure according to the nature of the fabric. Cloth manufactured from very fine material, which should have a soft and full handle, is crabbed without pressure, and only at a temperature of 120—140° Faht., whilst cloth produced from very hard wool, which easily breaks in washing and dyeing, is crabbed in boiling water, so as to set the fibre satisfactorily. In crabbing goods without great pressure, the process is usually carried out on the „Crabbing jack", whilst goods subjected to a strong pressure, are treated in the crabbing machine. After crabbing roll the pieces tightly on a second wooden roller and allow to cool. The pieces are taken off when cool and washed either in the rope or full width at a temperature of 95° Faht., by means of soap and soda or ammonia. Those fabrics which require to have a soft and full handle are treated again in the same manner, whilst such goods as have been manufactured from hard wool, such as Cheviots, etc. must be steamed, so as to prevent the fibre from breaking, and to give it a supple handle and high lustre.

Steaming. The tightly rolled up cloth is steamed after being crabbed. The steaming apparatus consists of a perforated cylinder made of iron or copper wrapped round

with a few layers of cotton or linen rags (lapping). The goods are wound on this cylinder, then covered with packing canvas firmly tied up at both ends, and now dry steam of 7—28 lb. pressure is blown through the axle. Then, in order to obtain a high lustre, allow the pieces, still rolled on the cylinder, to cool down, unwind, roll on again if necessary and in such a manner, that the end next to the cylinder during the first steaming process, is on the outside of the piece for the second treatment. Steaming can also be carried out with less pressure in a suitable apparatus (Vacuum steaming).

It is always advisable to steam the goods before dyeing, but only slightly after dyeing, as in this manner the best results are obtained. The fibre absorbs the dyestuff more uniformly if steamed before dyeing.

Note. After each steaming, especially if vertical steaming rollers are used, it is most advisable to place the rollers horizontally — but on no account vertically or slanting — on two trestles or some other arrangement, and to turn them a little every $^1/_2$ hour so as to cool the goods uniformly.

Goods steamed by an unskilled hand will, when dyed, show up many irregularities in the shape of dark ends and lists or larger or smaller well defined spots, which are not always visible before dyeing. Such faults, originating from the steaming process, but scarcely noticeable in undyed pieces, are usually — though unjustly — charged to the dyer.

76. Acid Colours fast to steaming.

(The colours were tested at 14 lb. pressure for 1 hour).

Red:
Alizarine Rubinole R
Azo Fuchsine B, 6B
Azo Crimson L
Azo Phloxine 2G
Bordeaux BX, extra
Brilliant Croceine 3B
Brilliant Double Scarlet 3R
Brilliant Ponceau 4R, 5R
Carmoisine 3B
Cochineal Scarlet PS
Croceine Scarlet 2B, 3B, 7B, 8B, 1BX, RX
Double Ponceau 1R—4R
Fast Red A, BT, E, NS
Fast Acid Magenta B
Crystal Ponceau 6R

Ponceau 1R, 2RL, 3R
Rhodamine B, B extra, G, G extra
Scarlet R

Orange: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB, GT, RO

Yellow: Quinoline Yellow, extra
Fast Light Yellow G, 2G, 3G
Indian Yellow GR, R
Naphtole Yellow S, SE
Naphtylamine Yellow
Tartrazine

Green: Alkali Fast Green 3B, 3G
Brilliant Acid Green 6B
Fast Green, bluish, extra, extra bluish, CR
Fast Light Green
Parrot Green
Acid Green extra, BB extra, 3B, BBN extra, GB extra, GG extra

Blue: Alizarine Sky Blue B
Alizarine Sapphirole B, SE
Anthracyanine BL, DL, FL, 3FL
Brilliant Alizarine Cyanine 3G
Brilliant Blue extra greenish
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B extra
Intensive Blue B
New Patent Blue 4B, GA
Red Blue extra conc.
Victoria Navy Blue DK
Wool Blue N extra, R extra, SR extra
Soluble Blue 3B extra greenish, greenish I, reddish I, TRG
Wool Fast Blue BL, GL, RL

Violet: Alizarine Irisole R
Alkali Violet LR, R
Azo Acid Violet A2B, AL, B extra, R extra, 4R
Fast Acid Violet 10B
Acid Violet 4B extra, 5B, 7B, 8B extra, 4BN extra, 6BN, 6BN extra, 6BNB, BW, HW, R extra, 3R, 4RS
Victoria Violet 4BS

Black: Cashmere Black B, 3BN, 3BX, T, TN
Naphtylamine Black 4AN, 10B, 4BN, 6BN
Brilliant Hat Black B
Phenylamine Black 4B, T
Acid Black LD

77. Acid Wool Colours, adapted for the production of fluorescent shades.

Red:	Rhodamine B, B extra, G, G extra
Yellow:	Fast Yellow extra
	Fast Light Yellow G, 3G
Blue:	Brilliant Wool Blue G extra
	New Patent Blue 4B
	Wool Fast Blue BL
Violet:	Acid Violet brands

78. Acid Wool Colours, adapted for dyeing in machines.

All Acid Colours are more or less adapted for dyeing in machines, but, of course, the best suited for this method of dyeing are the easily level dyeing colours.

79. Acid Wool Colours, which do not stain white cotton effects.

In order to obtain effects as white as possible, add a little more acid towards the end of the process.

Red:	Alizarine Rubinole R
	Azo Fuchsine 6B, G, S
	Azo Crimson S
	Azo Phloxine 2G
	Carmoisine B
	Fast Red NS
	Acid Magenta
Orange:	Fast Light Orange G
	Mandarine G
	Orange IIB, RO
Yellow:	Quinoline Yellow, extra
	Fast Yellow extra
	Fast Light Yellow G, 2G, 3G
	Indian Yellow G, GR
	Naphtole Yellow S
	New Yellow extra
	Tartrazine
Green:	Alkali Fast Green 3B, 3G
	Brilliant Acid Green 6B
	Fast Green bluish
	Cashmere Green B
	Acid Green GG extra
	Wool Green BS
Blue:	Alizarine Astrole B, G
	Alizarine Sapphirole B, SE
	Anthracyanine BL, DL, FL, 3FL
	Cashmere Blue TG extra

New Patent Blue B, 4B, GA
Victoria Navy Blue B, DK
Wool Blue SR extra
Wool Fast Blue BL, GL, RL

Violet: Alizarine Irisole R
Azo Acid Violet A2B, AL
Fast Acid Violet 10B
Acid Violet 4B extra, 8B extra, 6BN extra, BW, HW, R extra, 3R, 4RS
Victoria Violet 4BS

Black: Cashmere Black B, 6B, 3BN, T, TN
Naphtole Black 2B
Naphtylamine Black 10B, 4BK, 4BN, 6BN, S
Acid Black 5B, 4BL, LD

80. Acid Wool Colours, which do not dull cotton effects dyed with Basic colours.

Red: Alizarine Rubinole R
Azo Fuchsine 6B, G
Azo Crimson S
Azo Phloxine 2G

Orange: Fast Light Orange G
Orange IIB

Yellow: Quinoline Yellow
Fast Yellow extra
Fast Light Yellow G, 2G, 3G
Naphtole Yellow S
Tartrazine

Blue: Alizarine Sapphirole B
Cashmere Blue TG extra

Violet: Azo Acid Violet A2B, AL
Victoria Violet 4BS

Black: Cashmere Black T, TN

81. Wool Colours, which do not stain white silk effects.

It is advisable to dye boiling at a high temperature in a long liquor with the addition of 15—20% acetic acid. In dyeing with Diamond Blue R and Acid Chrome Black WS and when after-chroming in a fresh bath, about 5% acetic acid must be added besides the bichrome.

Red: Azo Cochineal
Azo Fuchsine 6B, G
Azo Crimson S
Azo Phloxine 2G
Cochineal Scarlet PS

	Fast Red NS
	Fast Acid Magenta B
Yellow:	Fast Yellow extra
	Fast Light Yellow 2G, 3G
	Naphtole Yellow S
	Tartrazine
Green:	Alizarine Emeraldole G
	Naphtole Green B
Blue:	Alizarine Sapphirole B
	Diamond Blue R (bichrome)
Violet:	Victoria Violet 4BS
Black:	Acid Chrome Black WS 23250 (bichrome)

82. Acid Wool Colours, especially adapted for the dyeing of carpet yarn.

Red:	Alizarine Rubinole R
	Azo Fuchsine 6B, G
	Azo Crimson S
	Azo Phloxine 2G
	Cochineal Scarlet PS
	Fast Red A, NS
	Fast Acid Magenta B
	Rhodamine B
Orange:	Fast Light Orange G
	Orange IIB
Yellow:	Fast Light Yellow G, 2G, 3G
	Indian Yellow G, GR, R
	Tartrazine
Green:	Alkali Fast Green 3B, 3G
	Brilliant Acid Green 6B
	Fast Green bluish
	Fast Light Green
	Wool Green BS
Blue:	Alizarine Astrole B, G
	Alizarine Sapphirole B, SE
	Anthracyanine BL, DL, FL, 3FL
	Brilliant Alizarine Cyanine 3G
	Brilliant Wool Blue B extra, G extra
	New Patent Blue B, 4B, GA
	Victoria Navy Blue B, DK
	Wool Fast Blue BL, GL, RL
Violet:	Alizarine Irisole R
	Azo Acid Violet A2B, AL, B extra, 4R
	Fast Acid Violet 10B
	Acid Violet 4B extra, BW
	Victoria Violet 4BS

Black: Naphtole Black 2B
Naphtylamine Black 10B, 4BN, 6BN
Victoria Black B

83. Alkali Blue.

Dye in a bath near the boil with an addition of 1—2% soda ash or 3% borax, and acidulate in a fresh, hot bath containing 5% sulphuric acid.

Alkali Blue 7B — 1B, 1R — 6R extra.

The Alkali Blues are fast to washing or milling, stoving and carbonization. After each treatment, however, the goods should be again acidulated, even also after neutralizing the carbonized shades. The shades are moreover fast to steaming and water.

Dyeing with Basic colours.

Dye in a neutral bath or with an addition of 1—2% acetic acid or 2—4% alum (especially so in case of calcareous water) at 175—195° Faht. The addition of acid or alum has the effect of levelling the colour.

Victoria Blue is dissolved in its own weight of conc. acetic acid and then dyed in a neutral bath, although it can also be dyed acid with 10% Glauber's salt cryst. and 2—4% sulphuric acid or with about 5% acetic acid. Likewise the Methyl Violets can be dyed with a little sulphuric acid if necessary.

The Basic colours are preferably dissolved in condensed water or, when using ordinary water, they are previously stirred up with acetic acid, in order to avoid the unpleasant tarring. It will also be found beneficial to correct the dyebath, according to the percentage of lime in the water, with 1—3 pints acetic acid 9° Tw. per 200 gallons water. A slight excess of acid is not detrimental, as same causes the dyestuff to be taken up more slowly. Dyed without acid, the Basic Colours are absorbed very quickly by the fibre, which easily tends to produce unlevel shades. The level dyeing is facilitated by the precaution of adding the dyestuff in several portions. — Auramine is an exception to the general rule, and must be dyed at a temperature of not more than 160° Faht.

84. List of Basic Colours.

Red: Brilliant Rhoduline Red B
Diamond Fuchsine
New Magenta

Rhodamine B, B extra, G, G extra
Rhoduline Red G
Saffranine FF extra

Orange: Chrysoidine G
Rhoduline Orange N

Yellow: Auracine G
Auramine II, O

Green: Brilliant Green cryst.
China Green cryst.

Blue: New Victoria Blue B
Turquoise Blue BB, G
Victoria Blue B

Violet: Brilliant Rhoduline Purple R
Crystal Violet P
Methyl Violet 7B—1B, 1R—5R
Rhoduline Heliotrope B
Rhoduline Violet

Brown: Bismarck Brown F, M; R extra

Grey: New Fast Grey

85. Basic Colours relatively fast to washing or milling.

Red: Rhodamine B, B extra, G, G extra

Blue: New Victoria Blue B

Violet: Brilliant Rhoduline Purple R
Crystal Violet P
Methyl Violet B, 2B, 3B, 5B, 6B, 7B

86. Basic Colours fast to stoving.

(Those colours marked with an asterisk leave white wool relatively clean).

Red: Brilliant Rhoduline Red B
* Rhodamine B, B extra, G, G extra
Rhoduline Red G
* Saffranine FF extra

Yellow: * Auramine II, O

Blue: New Victoria Blue B
Victoria Blue B

Violet: Brilliant Rhoduline Purple R
Rhoduline Heliotrope B
Rhoduline Violet

87. Basic Colours fast to ammonia 20%.

Red: Brilliant Rhoduline Red B
Rhodamine B, B extra, G, G extra
Rhoduline Red G

	Saffranine FF extra
Yellow:	Auramine II, O
	Chrysoidine G
Blue:	New Victoria Blue B
Violet:	Rhoduline Heliotrope B
	Rhoduline Violet

88. Basic Colours fast to carbonizing.

(After carbonizing the shades are neutralized with soda).

Red:	Rhodamine B, B extra, G, G extra
Violet:	Brilliant Rhoduline Purple R
Brown:	Bismarck Brown F, M, R extra

89. Basic Colours fast to steaming.

(The colours are steamed for 1 hour with 14 lbs. pressure).

Red:	Brilliant Rhoduline Red B
	Diamond Fuchsine
	New Magenta
	Rhodamine B, B extra, G, G extra
	Rhoduline Red G
	Saffranine FF extra
Green:	Brilliant Green cryst.
	China Green cryst.
Blue:	New Victoria Blue B
	Victoria Blue B
Violet:	Crystal Violet cryst., P
	Methyl Violet 7B—1B, 1R—5R
	Rhoduline Heliotrope B
	Rhoduline Violet
Grey:	New Fast Grey

90. Basic Colours which can be dyed in a soap bath and stoved subsequently.

Dye lukewarm with an addition of 5% olive oil soap; hard water should be previously corrected with soda. Hydro-extract the goods after dyeing, stove, rinse and dry.

Red:	Rhodamine B, B extra, G, G extra
	Saffranine FF extra
Yellow:	Auramine II, O
Green:	Brilliant Green cryst.
Blue:	Victoria Blue B
Violet:	Methyl Violet brands

Dyeing with Benzo Colours.

Dye with an addition of 2—3% acetate of ammonia or 10—20% Glauber's salt and 1—2% acetic acid, enter at 85—105° Faht., bring slowly to the boil and boil until the bath is exhausted. In case a further 1—2% acetic acid has to be added subsequently to better exhaust the liquor, it is advisable to turn off steam.

91. List of Benzo Colours.

Red:	Benzo Fast Red 9BL, FC, GL, L
	Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
	Benzo Purpurine 1B, 4B, 6B. 10B
	Brilliant Geranine B
	Congo Red
	Congo Rubine
	Delta Purpurine 5B
	Geranine G
Orange:	Benzo Fast Orange S
	Congo Orange G
	Pluto Orange G
Yellow:	Chloramine Yellow FF, M, W extra
	Chrysophenine G
	Thiazole Yellow G
Green:	Benzo Dark Green B
Blue:	Benzo Azurine G
	Benzo Blue RW
Brown:	Benzo Brown D3G extra, MC
	Benzo Chrome Brown B, G, 5G, R
	Pluto Brown GG, NB, R
Black:	Benzo Fast Black, L

In addition to the above, quite a number of other Benzo Colours can be employed for the dyeing of wool.

92. Benzo Colours fast to light.

Red:	Benzo Fast Red FC, GL, L
	Benzo Fast Scarlet brands
	Benzo Purpurine 1B
	Delta Purpurine 5B
	Geranine G
Orange:	Benzo Fast Orange S
	Congo Orange G
Yellow:	Chloramine Yellow M
	Chrysophenine G
Brown:	Benzo Chrome Brown G
Black:	Benzo Fast Black L

Benzo Colours which resist a moderate milling alongside white wool.

Red:	Benzo Fast Red 9BL, FC, L
	Benzo Fast Scarlet brands
	Benzo Purpurine 1B, 4B, 6B, 10B
	Brilliant Geranine B
	Congo Red
	Delta Purpurine 5B
Orange:	Benzo Fast Orange S
	Congo Orange G
	Pluto Orange G
Yellow:	Chloramine Yellow FF, M
	Chrysophenine G
Green:	Benzo Dark Green B
Blue:	Benzo Azurine G
	Benzo Blue RW
Brown:	Benzo Brown MC
	Benzo Chrome Brown B, G, 5G, R
	Pluto Brown GG, NB, R
Black:	Benzo Fast Black L

94. Benzo Colours fast to stoving.

Red:	Benzo Fast Red 9BL, FC, GL, L
	Benzo Fast Scarlet brands
	Benzo Purpurine 1B, 4B, 6B, 10B
	Brilliant Geranine B
	Congo Red
	Delta Purpurine 5B
Orange:	Benzo Fast Orange S
	Congo Orange G
	Pluto Orange G
Yellow:	Chloramine Yellow FF, M
	Chrysophenine G
Green:	Benzo Dark Green B
Blue:	Benzo Azurine G
	Benzo Blue RW
	Brilliant Azurine 5G
Brown:	Benzo Brown D3G extra, MC
	Benzo Chrome Brown G, 5G
	Pluto Brown GG, NB, R
Black:	Benzo Fast Black, L

95. Benzo Colours fast to carbonizing.

Red:	Benzo Fast Scarlet brands
	Benzo Purpurine 1B, 4B, 6B, 10B

Brilliant Geranine B
Congo Red
Delta Purpurine 5B

Orange: Benzo Fast Orange S

Yellow: Chloramine Yellow FF, M
Chrysophenine G

Blue: Benzo Azurine G
Benzo Blue RW

Brown: Benzo Brown MC
Benzo Chrome Brown B

96. Benzo Colours fast to steaming.

Red: Benzo Fast Red 9BL, FC, GL, L
Benzo Fast Scarlet brands
Benzo Purpurine 1B, 4B, 6B, 10B
Brilliant Geranine B
Congo Red
Congo Rubine
Delta Purpurine 5B

Orange: Benzo Fast Orange S
Congo Orange G
Pluto Orange G

Yellow: Chloramine Yellow FF, M
Chrysophenine G

Green: Benzo Dark Green B

Blue: Benzo Azurine G
Benzo Blue RW

Brown: Benzo Brown D3G extra, MC
Pluto Brown GG, NB

97. Benzo Colours fast to water alongside white wool.

(All Benzo Colours are fast to water with the exception of Benzo Fast Black.)

98. Bennzo Colours fast to ammonia 20%

Red: Benzo Fast Red 9BL, FC
Benzo Fast Scarlet brands
Benzo Purpurine 1B, 4B, 6B, 10B
Brilliant Geranine B
Congo Red
Congo Rubine
Delta Purpurine 5B

Orange: Benzo Fast Orange S
Congo Orange G
Pluto Orange G

Yellow:	Chloramine Yellow FF, M
	Chrysophenine G
Green:	Benzo Dark Green B
Blue:	Benzo Azurine G
	Benzo Blue RW
Brown:	Benzo Brown D3G extra, MC
	Benzo Chrome Brown B, G, 5G, R
	Pluto Brown GG, NB, R
Black:	Benzo Fast Black, L

Dyeing with Sulphon Colours.

The Sulphon Cyanine brands are dyed with an addition of 3—5% acetate of ammonia and sometimes with an addition of 5—10% Glauber's salt cryst. Enter the goods at 100—120° Faht., bring slowly to the boil, and work until the bath is exhausted. In case the bath does not perfectly exhaust, add a little acetic acid; the boiling liquor must react slightly acid. In order to get even shades on cloth which may not be perfectly clean, boiling with 3% bichrome before dyeing, will be found very advantageous. The dyeing is carried out as above stated, in a fresh bath.

The other Sulphon Colours are usually dyed with an addition of 10—20% Glauber's salt cryst. and 2—3% acetic acid; enter the goods at 100—120° Faht., and bring slowly to the boil. In order to completely exhaust the bath, add subsequently 1—2% acetic acid, and for the Sulphon Acid Blue use a subsequent addition of sulphuric acid or bisulphate of soda.

99. List of Sulphon Colours.

Red:	Anthracene Red
	Acid Anthracene Red 3B, G
Orange:	Sulphon Orange G
Yellow:	Sulphon Yellow 5G, R
Green:	Diamond Green SS
Blue:	Brilliant Sulphon Azurine R
	Sulphon Azurine, D
	Sulphon Cyanine G, GR extra, 3R, 5R extra
	Sulphon Acid Blue B, G, R
Black:	Sulphon Blue Black
	Sulphon Cyanine Black B, 2B
	Sulphon Black 3B, 4BT, G, R

100. Sulphon Colours fast to light.

Red:	Anthracene Red
	Acid Anthracene Red G

Yellow:	Sulphon Yellow 5G, R
Blue:	Sulphon Cyanine brands
	Sulphon Acid Blue brands
Black:	Sulphon Blue Black
	Sulphon Cyanine Black B, 2B
	Sulphon Black 3B, 4BT, G, R

101. Sulphon Colours which resist ordinary milling alongside white wool.

Red:	Anthracene Red
	Acid Anthracene Red 3B, G
Orange:	Sulphon Orange G
Yellow:	Sulphon Yellow 5G, R
Green:	Diamond Green SS
Blue:	Sulphon Cyanine G, GR extra, 3R, 5R extra
Black:	Sulphon Blue Black
	Sulphon Cyanine Black B, 2B

102. Sulphon Colours fast to stoving.

Red:	Anthracene Red
	Acid Anthracene Red 3B
Orange:	Sulphon Orange G
Yellow:	Sulphon Yellow R
Green:	Diamond Green SS

103. Sulphon Colours fast to carbonizing.

All Sulphon Colours are fast to carbonizing with the exception of Sulphon Cyanine 3R and 5R extra.

104. Sulphon Colours fast to steaming.

Red:	Anthracene Red
	Acid Anthracene Red 3B, G
Orange:	Sulphon Orange G
Yellow:	Sulphon Yellow 5G, R
Blue:	Sulphon Azurine, D

105. Sulphon Colours fast to water.

All Sulphon Colours are fast to water with the exception of Sulphon Blue Black.

106. Sulphon Colours fast to ammonia 20%.

All Sulphon colours are fast to ammonia.

107. Sulphon Colours which do not stain white cotton effects.

Sulphon Orange G
Sulphon Yellow 5G, R
Sulphon Acid Blue B, G, R
Sulphon Cynanine Black B, 2B

Dyeing with Alizarine and Mordant Colours.

Alizarine and Mordant Colours on a chrome mordant, alumina mordant and zinc mordant.

Mordanting. The mordant most frequently employed is the Chrome-Tartar mordant. Prepare the goods, according to the depth of shade desired, with 1—4% bichrome and $^3/_4$—$3^1/_2$% tartar by entering the goods near the boil and boiling for 1—2 hours; then rinse well.

In addition to the tartar mordant, there are others employed in practice, viz:

Bichrome-Lactic acid mordant:

$1^1/_2$—3% bichromate of potash or bichromate of soda
3% lactic acid (50%)
1—$1^1/_2$% sulphuric acid 168° Tw.

While stirring well, add the mordants one after the other to the bath, which should be at a temperature of 160° Faht., enter the wool, work $^1/_2$ hour at this temperature, bring the bath to the boil within $^1/_2$ hour and boil for 1 hour, The liquor should exhaust completely.

Bichrome — Formic acid Mordant:

1—$1^1/_2$% bichrome
1—$1^1/_2$% formic acid (90%).

Mordant in the same manner as stated for chrome-tatar.

Very often the so-called sweet chrome mordant is employed, which consists of boiling the wool for 1—$1^1/_2$ hours in a bath containing 2—3% bichrome without any other agent.

Alumina mordant (for Alizarine Red and Alizarine Orange). Mordant the wool at 195° Faht. for $1^1/_2$ hours with 6—10% sulphate of alumina (free from iron) or alum (free from iron) and 3—5% tartar. The tartar can be partly substituted by oxalic acid. The quantity of water necessary for mordanting must amount to about 30—50 times the weight of the goods. When mordanting, the material should be allowed to lie for 12 hours unrinsed, before being dyed.

Zinc mordant (for Reds fast to milling alongside white cotton). Add to the bath 3% zinc sulphate, enter at the boil, boil for $1^1/_2$ hours and rinse.

Dyeing. Dye on a chrome mordant and zinc mordant with an addition of 2—5 % acetic acid, enter at about 100° Faht., bring slowly to the boil, and boil for 1½—2 hours until the bath is completely or almost completely exhausted. In order to exhaust the bath better, acetic acid is sometimes added subsequently. For light shades (fashion shades) it is advisable to sometimes make an addition of 10—15 % Glauber's salt, in order facilitate the level dyeing. In addition, many Mordant Colours dyed on mordanted material can be rendered still faster to milling by an aftertreatment with a small quantity of bichrome.

Loose wool on an alumina mordant is usually dyed without acetic acid, but, in order to obtain a superior fastness to milling, an addition of

50 % acetate of lime of the weight of the colour
25 % tannic acid " " " " " "
12,5 % soap " " " " " "

is applied.

When working with paste colours, employ half of the percentages given.

108. List of Alizarine and Mordant Colours.

(Two-bath method.)

Red: Alizarine Red PS, SB, W, W extra, WS, WSM, WST pdr., WB, WR, X paste (chrome) (alumina)
Alizarine Purpurine 20 % (chrome) (alumina)
Anthracene Red
Diamond Bordeaux R
Cloth Red B, 3B extra G, 3G extra

Orange: Alizarine Orange G, GG, R, W (alumina)
Diamond Orange

Yellow: Alizarine Yellow 3G, R
Anthracene Yellow paste & pdr., C
Chrome Yellow D, DF, G, R extra
Diamond Flavine G
Diamond Yellow G

Green: Alizarine Cyanine Green E, G extra, 3G, K
Coeruleine paste, S, SW paste & pdr.
Diamond Green B, SS

Blue: Alizarine Blue BM, GG, GW, R, S, SR, SW, WA
Alizarine Cyanine G extra, GG, ND extra, NH extra, NS, NSG, NSG extra, NSV, R, R extra, RR, 3R double, WB, WB extra, WRB, WRR
Alizarine Sky Blue B

Alizarine Sapphirole B, C, SE
Brilliant Alizarine Blue G, R, 3R
Brilliant Alizarine Cyanine G, 3G
Chrome Blue paste
Chrome Cyanine G, R, T
Celestine Blue B
Delphine Blue
Gallamine Blue paste
Gallo Cyanine
Acid Chrome Blue B, BR, 2R

Violet: Alizarine Bordeaux B. G, GG
Alizarine Heliotrope R paste
Galleine

Brown: Alizarine Orange G, GG, R, W (chrome)
Anthracene Brown G, R, W
Diamond Brown paste
Fast Brown
Acid Anthracene Brown R, RH extra

Black: Alizarine Blue Black B, 3B
Alizarine Cyanine Black G
Alizarine Fast Grey, SP
Diamond Blue Black G, R, T

109. Alizarine and Mordant Colours especially fast to light.

Red: Alizarine Purpurine 20% (alumina)
Alizarine Red brands (chrome) (alumina)
Cloth Red B, G

Orange: Alizarine Orange brands (alumina)

Yellow: Alizarine Yellow 3G
Anthracene Yellow brands
Chrome Yellow D, DF, R extra
Diamond Flavine G

Green: Alizarine Cyanine Green brands
Coeruleine brands

Blue: Alizarine Blue brands
Alizarine Cyanine brands
Alizarine Sky Blue B
Alizarine Sapphirole brands
Brilliant Alizarine Blue brands
Brilliant Alizarine Cyanine G, 3G

Violet: Alizarine Bordeaux brands

Brown: Alizarine Orange brands (chrome)
Anthracene Brown brands
Acid Anthracene Brown R, RH extra

Black: Alizarine Blue Black brands
Alizarine Cyanine Black G
Alizarine Fast Grey brands
Diamond Blue Black brands

110. Alizarine and Mordant Colours fast to washing and milling alonside white wool.

Red: Alizarine Red brands pdr., X paste (ordinary milling)
Anthracene Red
Cloth Red 3B extra

Yellow: Alizarine Yellow brands
Anthracene Yellow brands
Chrome Yellow brands
Diamond Flavine G

Green: Alizarine Cyanine Green brands (ordinary milling)
Coeruleine brands
Diamond Green B, SS

Blue: Alizarine Blue brands
Alizarine Cyanine GG, ND extra, R, R extra, 3R double, WRR, (G extra, RR, WRB only stand an ordinary milling)
Alizarine Sky Blue B (ordinary milling)
Brilliant Alizarine Blue brands
Chrome Cyanine brands
Celestine Blue B
Delphine Blue
Gallamine Blue paste
Gallo Cyanine
Acid Chrome Blue brands

Violet: Alizarine Bordeaux B, G
Alizarine Heliotrope paste
Galleine

Brown: Alizarine Orange brands (chrome)
Anthracene Brown brands
Diamond Brown paste
Acid Anthracene Brown R, RH extra (are fast to milling when aftertreated with $^1/_2$—$1^0/_0$ bichrome)

Black: Alizarine Blue Black brands
Alizarine Cyanine Black G
Alizarine Fast Grey brands
Diamond Blue Black brands

111. Alizarine and Mordant Colours fast to washing and milling alongside white cotton.

Red: Alizarine Red brands pdr.
Alizarine Orange R (zinc mordant)

Yellow: Alizarine Yellow R
Anthracene Yellow brands

	Alizarine Cyanine Green brands (ordinary milling)
	Coeruleine brands
Blue:	Alizarine Blue brands
	Alizarine Cyanine ND extra, R, R extra, 3R double, WRR
	Brilliant Alizarine Blue brands
	Chrome Cyanine brands
	Gallamine Blue paste
	Gallo Cyanine
	Acid Chrome Blue brands
Violet:	Alizarine Bordeaux B, G
	Galleine
Brown:	Alizarine Orange brands (chrome)
	Diamond Brown paste
Black:	Alizarine Cyanine Black G
	Alizarine Fast Grey brands

112. Alizarine and Mordant Colours fast to stoving.

Red:	Alizarine Red brands
	Alizarine Purpurine 20%
	Anthracene Red
	Diamond Bordeaux R
	Cloth Red 3B extra, G, 3G extra
Orange:	Alizarine Orange brands (alumina)
Green:	Alizarine Cyanine Green brands
	Diamond Green B, SS
Blue:	Alizarine Blue brands
	Alizarine Cyanine brands
	Alizarine Sky Blue B
	Alizarine Sapphirole brands
	Brilliant Alizarine Blue brands
	Brilliant Alizarine Cyanine brands
	Chrome Cyanine brands
	Delphine Blue
	Acid Chrome Blue brands
Violet:	Alizarine Bordeaux brands
	Alizarine Heliotrope R paste
Brown:	Alizarine Orange brands (chrome) (slightly yellower)
	Anthracene Brown brands
Black:	Alizarine Blue Black brands
	Alizarine Cyanine Black G
	Alizarine Fast Grey brands
	Diamond Blue Black brands

113. Alizarine and Mordant Colours fast to ammonia 20%

(All Alizarine and Mordant Colours are fast to ammonia with the exception of:)

Red:	Alizarine Red X paste
	Cloth Red B, G
Yellow:	Diamond Flavine G
	Diamond Yellow G
Green:	Diamond Green B

114. Alizarine and Mordant Colours fast to steaming.

Red:	Alizarine Red brands
	Alizarine Purpurine 20%
	Anthracene Red
Orange:	Diamond Orange
Yellow:	Alizarine Yellow 3G
	Anthracene Yellow brands
	Chrome Yellow brands
	Diamond Flavine G
	Diamond Yellow G
Green:	Alizarine Cyanine Green brands
	Coeruleine brands
	Diamond Green SS
Blue:	Alizarine Blue brands
	Alizarine Sky Blue B
	Brilliant Alizarine Blue brands
	Chrome Blue paste
	Celestine Blue B
	Acid Chrome Blue B
Violet:	Alizarine Bordeaux G, GG
	Galleine
Brown:	Alizarine Orange brands (chrome)
	Anthracene Brown brands
Black:	Alizarine Blue Black brands
	Alizarine Fast Grey SP
	Diamond Blue Black G, R

115. Alizarine and Mordant Colours fast to carbonizing.

Red:	Alizarine Purpurine 20%
	Anthracene Red
	Diamond Bordeaux R
	Cloth Red 3G extra
Orange:	Diamond Orange
Yellow:	Alizarine Yellow 3G, R
	Anthracene Yellow C
	Chrome Yellow brands

Diamond Yellow G
Green: Alizarine Cyanine Green brands
Diamond Green B, SS
Blue: Alizarine Blue brands
Alizarine Cyanine GG, NS, NSG, NSV, RR
Alizarine Sky Blue B
Brilliant Alizarine Blue brands
Brilliant Alizarine Cyanine 3G
Chrome Blue paste
Chrome Cyanine brands
Celestine Blue B
Delphine Blue
Gallamine Blue paste
Gallo Cyanine
Acid Chrome Blue brands
Violet: Alizarine Heliotrope R paste
Brown: Alizarine Orange brands (chrome)
Anthracene Brown brands
Fast Brown
Acid Anthracene
Brown R, RH extra
Black: Alizarine Blue Black brands
Alizarine Cyanine Black G
Alizarine Fast Grey SP
Diamond Blue Black brands

116. Alizarine and Mordant Colours fast to water.

Red: Alizarine Red brands
Alizarine Purpurine 20%
Anthracene Red
Cloth Red B, 3B extra
Yellow: Alizarine Yellow 3G
Anthracene Yellow brands
Chrome Yellow D, DF, R extra
Diamond Flavine G
Diamond Yellow G
Green: Alizarine Cyanine Green brands
Coeruleine brands
Diamond Green B, SS
Blue: Alizarine Blue brands
Alizarine Cyanine G extra, GG, ND extra, R, R extra, 3R double, WRB, WRR
Alizarine Sky Blue B
Brilliant Alizarine Blue brands
Chrome Cyanine brands
Celestine Blue B
Delphine Blue B

	Gallamine Blue paste
	Gallo Cyanine
	Acid Chrome Blue brands
Violet:	Alizarine Bordeaux brands
	Alizarine Heliotrope R paste
	Galleine
Brown:	Alizarine Orange brands (chrome)
	Anthracene Brown brands
	Diamond Brown paste
Black:	Alizarine Blue Black brands
	Alizarine Cyanine Black G
	Alizarine Fast Grey brands
	Diamond Blue Black brands

117. Alizarine and Mordant Colours which do not tinge white cotton effects.

Red:	Diamond Bordeaux R
Blue:	Chrome Cyanine G, R
	Acid Chrome Blue B, BR, 2R
Brown:	Acid Anthracene Brown RH extra
Black:	Alizarine Blue Black B

Dyeing with Alizarine and Mordant Colours according to the one-bath method

(aftertreating with chrome).

Correct the water, if necessary, with acetic acid, add the well dissolved dyestuff, and then 2—4% acetic acid and 10—20% Glauber's salt cryst.; enter the goods at 120—140° Faht., bring slowly to the boil and boil for $^3/_4$—1 hour. Should the bath not be sufficiently exhausted, it is advisable to make a further addition of acetic acid, sulphuric acid or formic acid.

The colours usually exhaust sufficiently with acetic acid, but in certain cases a subsequent addition of sulphuric acid or formic acid will be found necessary, for example with the different brands of

Acid Anthracene Brown
Diamond Blue
Chrome Carmine
Acid Chrome Blue
Diamond Blue Black
Diamond Black
Acid Chrome Black

For Diamond Black F, FB etc. when dyed in machines, it is further advisable to add Monopole Soap or Turkey Red oil.

The dyeing process is followed by the chroming process. If the goods are to be chromed in the same bath, cool down the liquor to 140—160° Faht., and then add the requisite amount of bichrome or fluoride of chrome. Now bring slowly to the boil and boil for $^1/_2$—$^3/_4$ hour. Afterwards rinse thoroughly.

For light shades, the average amount of bichrome should be half that of the colour employed, for dark shades 2—2$^1/_2$% will be found sufficient. The Diamond Black series (apart from the P brands), however, form an exception, and are only aftertreated with 1—1$^1/_4$% bichrome in dark shades. For the Diamond Blues 3% bichrome must be used.

When aftertreating with fluoride of chrome, at least an equal amount of fluoride of chrome or 1$^1/_2$ times the amount of colour employed, must be used.

The Chrome Carmine brands are dyed with an addition of 10% Glauber's salt cryst. and 4% sulphuric acid. Enter at about 140° Faht., bring slowly to the boil and boil for 1—1$^1/_2$ hours. Then add for a 3—3$^1/_2$% shade, 3% bichrome, 3% lactic acid and, if necessary, a little sulphuric acid, and work for another $^3/_4$ hour.

The Diamond Black P brands are dyed in the following manner: Add to the dyebath 2$^1/_2$% acetic acid, enter the goods near the boil, bring slowly to the boil, boil for 15—20 minutes, add 2$^1/_2$% sulphuric acid, continue boiling for 15—20 minutes and now turn off steam, and work for another $^1/_2$ hour. The aftertreatment with bichrome is carried out in the usual manner, PV & PVB usually with 2$^1/_2$%, and P2B with 2—2$^1/_4$% bichrome.

When dyeing with the Diamond Black P series, with the Diamond Blue Black or Acid Chrome Blue Black brands in copper vessels, it is advisable to add ammonium sulphocyanide (about $^1/_8$ oz. per 10 gallons liquor).

Alizarine Orange R as a red is dyed with an addition of acetic acid and aftertreated with 3% zinc sulphate for $^1/_2$ hour at the boil.

118. List of Alizarine and Mordant Colours.

(one-bath method.)

Red:
- Alizarine Orange R (aftertreated with sulphate of zinc)
- Alizarine Red paste and pdr., all brands
- Anthracene Red
- Benzo Fast Red FC (bichrome or fluoride of chrome)
- Diamond Bordeaux R

Acid Anthracene Red 3B, G
Cloth Red B, 3B extra, G, 3G extra

Yellow: Alizarine Yellow 3G, R
Anthracene Yellow C
Chrome Yellow D, DF, G, R extra
Diamond Flavine G

Green: Diamond Green B, 3G, SS
Alizarine Cyanine Green E, G extra, 3G, K

Blue: Alizarine Cyanine GG, ND extra, NS, NSG, RR, WRR paste (bichrome), 3RS (bichrome or fluoride of chrome), BBS, WRS, WRS extra (fluoride of chrome)
Brilliant Alizarine Blue G, R, 3R (fluoride of chrome)
Brilliant Alizarine Cyanine G, 3G (fluoride of chrome)
Chrome Carmine A, B, 3B
Chrome Cyanine G, R, T
Diamond Blue 3B, R
Acid Chrome Blue B, BR, 2R

Brown: Alizarine Orange R (bichrome)
Fast Brown
Acid Anthracene Brown G, R, RH extra, T, V, VT, W
Acid Chrome Brown T

Black: Alizarine Blue Black B, 3B
Alizarine Cyanine Black G
Alizarine Fast Grey, SP,
Diamond Blue Black G, R, T
Diamond Black A, AF, 2B, F, FB, FE, GA, NG, NR, P2B, PV, PVB, ST
Acid Chrome Black B, G, RH, RHN, TC

119. Mordant Colours specially fast to light.

Red: Alizarine Orange R (sulphate of zinc)
Alizarine Red brands pdr. and paste
Anthracene Red
Benzo Fast Red FC
Acid Anthracene Red G
Cloth Red B, G

Yellow: Alizarine Yellow 3G
Anthracene Yellow C
Chrome Yellow D, DF, R extra
Diamond Flavine G

Green: Alizarine Cyanine Green brands

Blue: Alizarine Cyanine ND extra, NS, NSG, RR, WRR paste, 3RS, BBS, WRS, WRS extra

Brilliant Alizarine Blue G, R
Brilliant Alizarine Cyanine G, 3G
Chrome Carmine brands
Chrome Cyanine G, R, T
Diamond Blue 3B, R
Acid Chrome Blue BR, 2R

Brown: Alizarine Orange R (bichrome)
Acid Anthracene Brown, R, RH extra, T, V, VT, W
Acid Chrome Brown T

Black: Alizarine Blue Black B, 3B
Alizarine Cyanine Black G
Alizarine Fast Grey, SP,
Diamond Blue Black G, R, T
Diamond Black brands
Acid Chrome Black brands

120. Mordant Colours fast to washing and milling alongside white wool.

Red: Alizarine Orange R (sulphate of zinc)
Alizarine Red brands pdr. and paste (X ordinary milling)
Anthracene Red
Benzo Fast Red FC
Diamond Bordeaux R
Acid Anthracene Red 3B. G
Cloth Red 3B extra, 3G extra

Yellow: Alizarine Yellow 3G
Anthracene Yellow C
Chrome Yellow brands
Diamond Flavine G

Blue: Alizarine Cyanine BBS, GG, ND extra, 3RS, WRR, WRS, WRS extra, RR (ordinary milling)
Alizarine Sky Blue B (ordinary milling)
Brilliant Alizarine Blue G, R, 3R (fluoride of chrome)
Chrome Carmine brands
Chrome Cyanine brands
Acid Chrome Blue brands

Brown: Alizarine Orange R (bichrome)
Fast Brown
Acid Anthracene Brown brands
Acid Chrome Brown T

Black: Alizarine Blue Black B, 3B
Alizarine Cyanine Black G

Alizarine Fast Grey, SP
Diamond Blue Black brands
Diamond Black brands
Acid Chrome Black brands

121. Mordant Colours fast to washing and milling alongside white cotton.

Red: Alizarine Orange R (zinc sulphate)
Alizarine Red brands pdr.
Acid Anthracene Red 3B, G
Yellow: Alizarine Yellow 3G
Anthracene Yellow C
Chrome Yellow D, DF, R extra
Green: Alizarine Cyanine Green brands (ordinary milling)
Blue: Alizarine Cyanine BBS, ND extra, 3RS, WRR, WRS, WRS extra
Chrome Cyanine brands
Acid Chrome Blue brands
Brown: Alizarine Orange R (bichrome)
Acid Anthracene Brown brands
Black: Alizarine Blue Black B, 3B
Alizarine Cyanine Black G
Alizarine Fast Grey, SP
Diamond Blue Black brands
Diamond Black AF, FE, P2B, PV, PVB

122. Mordant Colours fast to stoving.

All Mordant Colours are fast to stoving with the exception of
Acid Anthracene Red G (somewhat yellower)
Alizarine Yellow R
Diamond Black ST

123. Mordant Colours fast to ammonia 20 %.

All Mordant Colours are fast to ammonia with the exception of
Alizarine Orange R (sulphate of zinc)
Alizarine Red X paste
Cloth Red B, G
Diamond Flavine G
Diamond Green B
Diamond Blue 3B, R

124. Mordant Colours fast to steaming.

Red: Alizarine Orange R (sulphate of zinc)
Alizarine Red brands

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Benzo Fast Red FC
Acid Anthracene Red 3B
Cloth Red B, G. 3G extra.

Yellow: Alizarine Yellow 3G, R
Anthracene Yellow C
Chrome Yellow brands
Diamond Flavine G

Green: Alizarine Cyanine Green brands
Diamond Green 3G, SS

Blue: Brilliant Alizarine Blue brands
Chrome Carmine brands
Chrome Cyanine brands
Diamond Blue 3B, R
Acid Chrome Blue brands

Brown: Alizarine Orange R (chrome)
Fast Brown
Acid Anthracene Brown brands
Acid Chrome Brown T

Black: Alizarine Blue Black B, 3B
Alizarine Fast Grey, SP,
Diamond Blue Black brands
Diamond Black A, AF, 2B, 4B, F, FB, FE, P2B, PV, PVB
Acid Chrome Black B, G, RH, RHN

125. Mordant Colours fast to carbonising.

Red: Alizarine Orange R (sulphate of zinc)
Anthracene Red
Benzo Fast Red FC
Diamond Bordeaux R
Acid Anthracene Red 3B, G
Cloth Red brands

Yellow: Alizarine Yellow 3G
Anthracene Yellow C

Green: Alizarine Cyanine Green brands
Diamond Green 3G, SS

Blue: Alizarine Cyanine GG, NS, NSG, RR
Alizarine Sky Blue B
Brilliant Alizarine Blue brands
Brilliant Alizarine Cyanine G, 3G
Chrome Carmine brands
Chrome Cyanine brands
Diamond Blue 3B, R
Acid Chrome Blue brands

Brown: Alizarine Orange R (bichrome)
Fast Brown

	Acid Anthracene Brown brands
	Acid Chrome Brown T
Black:	Alizarine Blue Black B, 3B
	Alizarine Cyanine Black G
	Alizarine Fast Grey, SP
	Diamond Blue Black brands
	Diamond Black brands
	Acid Chrome Black brands

126. Mordant Colours fast to water.

All Mordant Colours are fast to water with the exception of
Cloth Red B, G, 3G extra
Alizarine Yellow R
Alizarine Cyanine NS, NSG
Brilliant Alizarine Cyanine G, 3G

127. Mordant Colours fast to potting.

Anthracene Yellow C
Acid Chrome Blue B, BR
Diamond Black AF, FE, P2B, PV, PVB
Diamond Blue Black T

128. Mordant Colours which do not tinge white cotton effects.

Red:	Diamond Bordeaux R
Yellow:	Chrome Yellow DF
Green:	Diamond Green 3G
Blue:	Chrome Carmine brands
	Chrome Cyanine G, R
	Diamond Blue 3B, R
	Acid Chrome Blue BR
Brown:	Acid Anthracene Brown RH extra, V
Black:	Alizarine Blue Black B
	Diamond Black A
	Acid Chrome Black B, G, RH, RHN, TC

129. Acid Colours most frequently used for shading Mordant Colours.

(Those marked with an asterisk are relatively fast to milling).

Red:	*Alizarine Rubinole R
	Azo Fuchsine 6B
	Azo Crimson S
	Azo Phloxine 2G

Orange: Fast Light Orange G
*Sulphon Orange G
Yellow: Fast Light Yellow G, 2G, 3G
*Sulphon Yellow 5G, R
*Tartrazine
Green: *Alkali Fast Green 3B, 3G
*Brilliant Acid Green 6B
Fast Green CR
Blue: *Alizarine Astrole B, G
*Alizarine Sky Blue B
*Alizarine Sapphirole B, SE
*Brilliant Wool Blue B extra, G extra
New Patent Blue B, 4B, GA
*Wool Blue SR extra
*Wool Fast Blue BL, GL
Violet: Fast Acid Violet 10 B
Acid Violet 4B extra*, 6BNB, BW

Hat Dyeing.

a) Ladies' woollen felt hats.

Ladies' hats are not usually required to be so fast as gentlemen's, and therefore Acid colours are generally employed for the former. The bodies are boiled well in water for 20 minutes before dyeing, then slightly rinsed and hydroextracted. Above all, it is necessary to employ well penetrating colours which are also possessed of sufficient fastness to alkalies.

a) Directions for dyeing acid milled hot bodies, or acid milled bodies carbonised and afterwards neutralised, or bodies milled merely with soap.

Dye with the necessary amount of dissolved colour and an addition of 15 % Glauber's salt crist. and 2—4 % sulphuric acid, or 10 % Glauber's salt cryst. and 5—10 % bisulphate of soda. Enter the well soaked bodies at 120 % Faht., work for $^1/_4$ hour at this temperature, bring to the boil within $^1/_2$ hour and boil for 1 hour. Should the dye-liquor not be sufficiently exhausted, add further 1—2 % sulphuric acid or 2—5 % bisulphate of soda. If the bodies to be dyed are difficult to penetrate, it is advisable to start working with little or no sulphuric acid at all and to add the remaining quantity in two portions, after boiling for $^1/_2$ hour so as to obtain a more complete penetration. After dyeing rinse well. Another method of dyeing is the following: Prepare the dyebath with 10 % Glauber's salt cryst., the necessary amount of colour and just as much acetic acid as to give the bath an acid character. Enter the hoods lukewarm

work (inside out) for 1/4 hour without steam, and then bring slowly to the boil; after boiling for 1/2 hour, turn the hoods and add 2% sulphuric acid in 2 or 3 portions, and boil for a further 3/4 hour.

b) Directions for dyeing hats in the form (unplanked) either carbonised and acid milled in the form, or acid milled and carbonised in the fully planked condition, without being neutralised.

Such bodies are entered at 105° Faht. in the bath prepared with 5% borax, and boiled for 1 hour. The addition of borax merely neutralises the excess of free acid in the bath. An addition of acid is not necessary in most cases. The dye-liquor, notwithstanding the borax, exhausts well.

b) Gentlemen's fur or woollen felt hats.

First soak the fur bodies in hot water. Select such colours as dye easily level, of good penetrating properties and good fastness to light. They should furthermore be fast to steaming and hot-pressing. Mordant colours can either be dyed on a chrome mordant or first in an acid bath and then aftertreated with chrome.

a) Dyeing on a Chrome Mordant.

a) Mordanting.

The bodies are previously mordanted with
2% bichrome and 1,75% tartar
for light shades, and with
3 1/2% bichrome and 3% tartar
for dark shades.

In many cases wool hats are treated in a mordanting bath containing 1/2—1% sulphuric acid or oxalic acid.

Enter the lukewarm bath, work for about 1/4 hour without steam, then bring to the boil within 1/2 hour, and boil for 1 1/2 hours. Rinse well and hydroextract after mordanting.

b) Dyeing.

Prepare the dyebath with 5% acetate of ammonia and the necessary amount of Mordant Colour, enter the bodies (inside out) at about 105—120° Faht., work for 1/2 hour without steam and then turn the bodies back again. Bring the liquor within 1/2—3/4 hour up to the boil and continue boiling for 1/2 hour. After this, add 1—2% acetic acid in the usual manner, and boil for another 1/2—3/4 hour.

b) Dyeing acid and aftertreating with chrome.

a) Dyeing.

Prepare the dyebath with 30—40 % Glauber's salt cryst. and 4 % sulphuric acid and add the well dissolved colour. Enter the bodies inside out, work for 10 minutes without steam, bring to the boil within 1 hour and boil for 1 hour. Then take out the bodies and turn same.

Many hat-dyers prefer to start with 1—2 % acetic acid instead of 4 % sulphuric acid, and only add sulphuric acid later in order to exhaust the bath.

b) After-chroming.

Add to the dyebath, which should be cooled down to 130—140° Faht., 1—3 % bichrome or bichromate of soda, enter the goods right side out, work for 10 minutes without steam, bring slowly to the boil and boil for $^1/_2$—$^3/_4$ hour. The goods can then be shaded if necessary.

Hats are now often dyed in the half-planked state or in the form (unplanked), as they are easier to penetrate than when dyed in the body. The colours employed for this purpose, however, must be fast to acid, besides possessing the previously mentioned properties, in order to withstand the acid milling with sulphuric acid.

130. Acid dyeing Wool Colours suitable for dyeing hat bodies.

Red:	Alizarine Rubinole R
	Azo Fuchsine B, 6B, G
	Azo Crimson L, S
	Azo Phloxine 2G
	Bordeaux extra
	Double Ponceau 1R-4R
	Fast Red A, BT, NS
	Rhodamine B, G
	Cloth Red 3B extra
Orange:	Croceine Orange G
	Fast Light Orange G
	Mandarine G
	Orange IIB
Yellow:	Quinoline Yellow
	Fast Yellow extra
	Fast Light Yellow G, 2G, 3G
	Indian Yellow G, GR, R
	Naphtol Yellow S
	New Yellow extra
Green:	Alkali Fast Green 3B, 3G

	Brillant Acid Green 6B
	Fast Green bluish, CR
	Fast Light Green
	Acid Green GB extra, GG extra
	Wool Green BS
Blue:	Alizarine Astrole B, G
	Alizarine Sapphirole B, SE
	Anthracyanine BL. DL, FL, 3FL
	Fast Acid Blue B, B extra
	Intensive Blue B
	New Patent Blue B, 4B, GA
	Victoria Navy Blue DK
	Wool Blue N extra, R extra
	Wool Fast Blue BL, GL
Violet:	Azo Acid Violet AL, B extra, R extra, 4R
	Fast Acid Violet 10 B
	Acid Violet 4B extra, 8B, 6BN extra, 6BNB, 4RS
	Victoria Violet 4BS
Black:	Naphtylamine Black 4B, 6B, 4BK, 4BN, 6BN, S
	Brilliant Hat Black B
	New Victoria Black B
	Hat Black BF, extra AI
	Phenylamine Black 4B, T
	Acid Black 4BL, FL, 22985, 23008, 23065, 23437*)
	Victoria Black B
	Wool Black B, N4B

131. Alizarine and Mordant Colours suitable for dyeing hat bodies.

(see chap. 108, page 90, and chap. 118, page 97).

Shoddy.

The dyeing of shoddy is generally carried out in exactly the same way as stated for ordinary wool.

As the material is in most cases of a very heterogeneous nature, containing now and again very dark dyed fibres, it must be stripped before dyeing, in order to obtain a brighter shade fast to milling. When dyeing shoddy, which has not been previously stripped, with colours fast to milling, it may happen that the old colours bleed during the milling process. This is the reason why it is necessary to strip

*) The colours followed by numbers are special brands for dyeing hats.

the material, when shades fast to milling are desired. On the other hand, pieces which are not required to be fast to milling, are only stripped in such cases where considerably brighter shades are required than the ground colour.

The stripping is done according to the following methods:

1. Stripping with sulphuric acid and Glauber's salt. Certain Acid colours can be stripped sufficiently in a boiling bath prepared with Glauber's salt and sulphuric acid.

2. Stripping with soda or ammonia. Employ 8—10 % soda ash (of the weight of the material) or ammonia. The temperature of the liquor should not be above 100—120° Faht., otherwise the material will be affected. Soak the material for 20—30 minutes and then rinse thoroughly.

3. Stripping with bichrome and sulphuric acid. Boil the material for $^3/_4$—1 hour with about 3—4 % bichrome and 4—$5^1/_2$ sulphuric acid. A little oxalic acid is sometimes added. Previous to boiling off with bichrome, the goods are often stripped with soda in order to ensure shades perfectly fast to milling.

(The boiling off with bichrome also acts as a mordant, and consequently, the material can be dyed with Alizarine and Mordant colours).

4. Stripping with Nitric acid. Add about 60 cc Nitric acid per litre water, and work near the boil until the goods are sufficiently stripped.

5. Stripping with Decroline. Prepare the stripping-bath with 3—5 % Decroline and 3—5 % sulphuric acid, calculated on the weight of the goods. Enter the goods, previously cleaned in the usual manner with a water or soda solution, lukewarm, raise to the boil and work at this temperature for 15—30 minutes. Acetic or formic acid can be employed instead of sulphuric acid. Care should be taken that the liquor remains acid to the end. The stripping must be carried out in wooden vessels: exposed steam coils should wrapped up.

If shades fast to milling are required, the material is often treated first with soda, as stated under 2, and then stripped with Decroline.

Note. As the various old colours behave differently during the stripping process, it is advisable to first of all make trials on a small scale to ascertain the method which it is most advantageous to employ.

Dyeing of shoddy.

Seeing that the dyeing of shoddy generally corresponds with that of wool, as mentioned above, we refer to the directions for dyeing under the headings:

Acid Colours, chapter 69, pages 64 & 65
Basic Colours, chapter 84, page 81
Benzo Colours, chapter 91, page 84
Sulphon Colours, chapter 99, page 87
Alizarine and Mordant Colours, chapter 108, page 90, chapter 118, pages 97—102

In order to further the levelling of Acid Colours on shoddy which has previously been boiled with sulphuric acid and not rinsed, no acid should be added at the commencement.

When employing Benzo colours, it will be necessary to neutralize the material with soda before dyeing.

Carbonised shoddy. Shoddy is usually carbonised on account of the vegetable impurities it contains. The process is carried out in the same way as the carbonisation of wool, see page 72. In dyeing carbonised shoddy which is not neutralized, an adition of acid should be omitted at the commencement, and only 10—20 % Glauber's salt should be added. Now and again a little soda is added to the bath according to the colour employed, in order to prevent the colour rushing too quickly on the fibre and giving uneven results. If the liquor does not exhaust sufficiently, acetic or sulphuric acid should be subsequently added.

Shoddy containing cotton. Shoddy which is not carbonised, and which contains a larger or smaller amount of vegetable impurities, is usually dyed with Benzo Colours. As the method of dyeing then corresponds exactly with the process employed for the dyeing of half-wool, we refer to page 109 for further directions.

Half-wool Dyeing.

Dyeing with Benzo Colours.

The Benzo Colours are classified as follows, according to their behaviour towards wool or cotton.

1. Benzo Colours which dye the wool and cotton the same or almost the same shade and depth.
2. Benzo Colours which dye wool and cotton a similar shade, but the cotton more intensively.
3. Benzo Colours which dye cotton intensively, but wool only slightly.
4. Benzo Colours which dye wool a deeper shade than cotton.
5. Benzo Colours which do not dye wool and cotton the same shade.

Besides Benzo Colours, Acid and slightly Acid dyeina Wool Colours, which are well absorbed by the wool in g neutral Glauber's Salt bath, are used for shading or deepening the wool, where the Benzo Colours alone will not do.

Dyeing according to the one-bath process.

Dye in a neutral bath containing 20—30% Glauber's Salt cryst. As a rule, when dyeing at the boil, the colour will go more on to the wool, whereas at a low temperature, it will dye the cotton a deeper shade. From this it is evident that a proper regulation of the temperature is absolutely necessary for the production of solid (uniform) shades. When dyeing dark shades, the baths will not exhaust; it is therefore advisable to dye in as short liquors as possible, and to work in a standing bath. Light shades are usually dyed in long liquors. The Glauber's Salt employed must not be acid, but neutral. Glauber's Salt, if slightly acid, would cause the Benzo Colours to rush more rapidly on to the wool and detain same from the cotton, and in addition, the shades would most likely turn out uneven.

In cases where it is found necessary to shade with Wool Colours, same should be added to the boiling bath. For the production of self or solid shades, use the Benzo Colours mentioned under groups 1 and 2, or 3 if necessary, and also wool colours which dye in a neutral bath.

132. Benzo Colours which dye wool and cotton the same or almost the same shade and depth.

Red: Benzo Bordeaux 6B
Benzo Fast Red 9BL, FC
Benzo Fast Scarlet 8BA
Benzo Purpurine 4B, 6B
Benzo Rhoduline Red B, 3B
Benzo Red 10B, SG
Brilliant Congo R
Brilliant Purpurine R
Congo Red
Delta Purpurine 5B
Geranine G

Orange: Orange TA
Toluylene Orange R

Yellow: Benzo Fast Yellow 5GL
Chloramine Yellow M
Thiazole Yellow G, 3G, GL, R

Green: Benzo Dark Green B
Benzo Green C

Blue: Navy Blue for Halfwool B

Brown: Benzo Brown D3G extra, 5R
Benzo Chrome Brown G, 5G
Brown for Halfwool R
Pluto Brown R

Black: Benzo Fast Black
Direct Blue Black B
Direct Deep Black E, E extra, EW, EW extra, RW, RW extra
Black for Halfwool B, BGN, BGS, LS
Pluto Black A, A extra, BS extra, TG extra, TG extra concd.

*The following colours are special brands for re-dyeing garments
Blue 20641
Navy Blue for Halfwool 23446
Black for Halfwool 23269.

133. Benzo Colours which dye wool and cotton a similar shade, but the cotton more intensively.

Red: Benzo Fast Red GL, L
Benzo Fast Scarlet 4BA, 8BS

	Benzo Purpurine 10B
	Brilliant Geranine B
	Chloramine Red 8BS
Orange:	Benzo Fast Orange S
	Congo Orange RG
Yellow:	Chloramine Yellow C, FF, RC
	Chrysophenine R
Green:	Benzo Olive
Blue:	Benzo Blue 2B, 3B, RW
	Benzo Cyanine B, 3B
	Benzo Fast Blue G, 5R
	Benzo Copper Blue B, 2B
	Benzo Sky Blue 4B
	Benzo Red Blue G
	Brilliant Azurine B, R, 2R
	Brilliant Benzo Blue 6B
	Chicago Blue B
	Congo Blue 2B
	Diazo Blue Black
Violet:	Azo Violet
	Benzo Violet R
	Chloramine Violet R
Brown:	Benzo Brown MC, RC
	Benzo Chrome Brown B, BS, R
	Benzo Dark Brown extra
	Chloramine Brown G
	Direct Fast Brown B, GG
	Toluylene Brown B, M
Black:	Benzo Fast Black L
	Diazo Black 2B
	Direct Blue Black N
	Black for Halfwool G, N
	Pluto Black 3B extra, CR, F extra, FR, G

134. Benzo Colours which dye cotton a deep shade, but wool only very slightly.

Red:	Benzo Fast Pink 2BL
	Benzo Fast Scarlet 4BS, 5BS, GS
Orange:	Chloramine Orange G
Yellow:	Chloramine Yellow GG, HW
	Direct Yellow R, R extra
Blue:	Benzo Chrome Black Blue B
	Benzo Sky Blue
	Brilliant Azurine 5G
Black:	Diazo Black BHN
	Direct Black VT

135. Benzo Colours which dye wool a deeper shade than cotton.

Red:	Benzo Purpurine 1B
	Benzo Red 12B
	Hessian Purple N
	Rose Azurine B, G
Orange:	Congo Orange G, R
	Pluto Orange G
	Toluylene Orange G
Yellow:	Chloramine Yellow W extra
	Chrysamine G, R
	Chrysophenine G
Green:	Benzo Dark Green GG
Blue:	Blue for Half wool
Brown:	Benzo Brown B, BR, BX, G, R extra
	Pluto Brown NB

136. Benzo Colours which do not dye wool and cotton the same shade.

Red:	Congo Corinth B, G
	Congo Rubine
Green:	Benzo Green BB, G
Blue:	Azo Blue
	Benzo Azurine G, 3G, R, 3R
	Benzo Blue BX, 2R, 4R
	Benzo Cyanine R
	Benzo Fast Blue BN
	Brilliant Azurine R, 5R
	Brilliant Fast Blue B, 2G
	Chicago Blue R
Violet:	Benzo Violet RL extra
	Brilliant Benzo Violet B, 2R
	Heliotrope BB
Brown:	Benzo Brown GG, NB, NBR, NBX
	Benzo Chrome Brown CR, 3R
	Diazo Brown G
	Direct Bronze Brown
	Pluto Brown GG
Black:	Benzo Chrome Black B, N
	Diazo Black B, 3B, R, R extra.

137. Acid and slightly acid dyeing Wool Colours which are well absorbed by the wool in a neutral Glauber's salt bath, and which tinge the cotton only a little, if at all.

Red:	Alizarine Rubinole R
	Rhodamine B, G
	Acid Anthracene Red 3B, G
Yellow:	Fast Light Yellow G
	Metanil Yellow
	Naphtol Yellow S
	Sulphon Yellow 5G, R
Green:	Alizarine Cyanine Green E, G extra, K
	Alkali Fast Green 3B, 3G
Blue:	New Patent Blue B, 4B
	Wool Green BS
Violet:	Alizarine Irisole R
	Acid Violet 4B extra, 5B, 6BN

138. Acid and slightly acid dyeing Wool Colours which are well absorbed by the wool in a neutral Glauber's salt bath and which tinge the cotton more or less.

Red:	Brilliant Croceine 3B
	Double Ponceau 1R-4R
	Fast Red A
	Eosine I bluish, S extra yellowish
	Metanil Red 3B
Orange:	Croceine Orange G, R
	Mandarine G
	Orange IIB, GT, RO
	Sulphon Orange G
Yellow:	Indian Yellow G, GR, R
	Naphtylamine Yellow
	New Yellow extra conc.
Green:	Brilliant Acid Green 6B
	Fast Green CR
	Fast Light Green
Blue:	Alizarine Sky Blue B
	*Alkali Blue brands
	Brilliant Wool Blue B extra, G extra
	Fast Acid Blue B extra
	Intensive Blue
	Sulphon Cyanine G, GR extra, 3R, 5R extra

* When Alkali Blue is used, the shade must be acidulated after rinsing.

	Wool Blue N extra, R extra, SR extra
	Wool Fast Blue BL, GL, RL
Violet:	Alkali Violet LR
	Acid Violet 8B extra, 4BN extra, HW, R extra
Brown:	Cashmere Brown V
Black:	Naphtaline Acid Black 4B
	Naphtylamine Black 4BK, 6BN
	Phenylamine Black 4B, T
	Acid Black 5B
	Sulphon Cyanine Black B, 2B
	Sulphon Black 4BT, G, R

Dyeing according to the two-bath process.

There are five distinct methods, viz:

Recipe 1. Dye the cotton in the usual manner with Benzo Colours fast to cross-dyeing, rinse and then dye the wool with suitable Wool Colours in an acid bath. (For Cotton Colours fast to cross-dyeing see chapter 18, page 19; Wool Colours chapter 69, page 64.)

Recipe 2. Dye the wool in an acid bath, rinse well and cover the cotton in a cold or lukewarm bath with Benzo Colours and work with an addition of 20% Glauber's salt cryst. and, if necessary 1—2% soda ash. The soda assists in dyeing the cotton principally and at the same time detains the colour from the wool (See chapter 12, page 14.)

Recipe 3. Dye the wool in the usual manner, rinse, mordant the cotton as stated on page 41 and cross-dye in a cold bath with Basic Colours and an addition of a little acetic acid or alum. When dyeing according to this recipe, the wool should be dyed a somewhat lighter and brighter shade, as in cross-dyeing the cotton, the wool always takes up a little of the Basic Colour. All Acid dyeing and Basic Colours are suitable for this method.

Recipe 4. First dye the cotton in a cold bath with Katigen Colours and then dye the wool. Dissolve the Katigen Colour with an equal or double amount of sulphide of soda cryst., pour the solution into the dyebath, which should not be above 95° Faht., then add 20—40% common salt and finally whilst stirring, slowly add an equal to $1^1/_2$ times the amount of bilactate of soda* as sulphide of soda taken.

* Bilactate of soda is produced by dissolving
24 oz. soda ash in
1 gallon water and slowly adding
1 „ lactic acid 49—50% to same.

In some instances even double the amount of bilactate of soda may be added, and the more one uses of this ingredient, the better will be the condition of the wool. An excess however would cause the colour to precipitate. If this inadvertently occurs, the liquor is corrected by adding a little more sulphide of soda. Dye for 1—1¼ hours at 70—85° Faht., rinse well, acidulate with acetic acid and cross-dye the wool as usual (For Katigen Colours fast to cross-dyeing see chapter 35, page 37.)

Recipe 5. Dye the wool as usual with suitable Acid Colours or such as are adapted for after-chroming, rinse thoroughly and then cover the cotton in a cold bath with Katigen Colours see recipe 4.)

Dyeing in the Milling.

Pluto Black BS extra and Pluto Milling Black B are the best adapted Colours for dyeing in the milling. They are dissolved at the boil in as little water as possible and afterwards stirred into the soap necessary for milling the pieces, the whole being then poured over the goods. The material is now milled as usual, and preferably allowed to lie in the soap for 1—2 hours after milling. Wash with plenty of water and hydroextract, after which cross-dye the wool with acid colours.

139. Benzo Colours suitable for dyeing in the milling (covering of vegetable fibre) but unsuitable for being cross dyed in an acid bath.

Red:	Benzo Bordeaux 6B
	Benzo Fast Red GL
	Benzo Fast Scarlet brands
	Benzo Purpurine 10 B
	Benzo Rhoduline Red B
	Benzo Red 12B, SG
	Brilliant Geranine B
	Brilliant Purpurine R
	Congo Rubine
	Geranine G
Orange:	Benzo Fast Orange S
Yellow:	Chloramine Yellow M, W extra
	Chrysophenine G, R
	Thiazole Yellow GL
Blue:	Benzo Blue 3B
	Benzo Sky Blue 4B
	Brilliant Benzo Blue 6B
Violet:	Benzo Violet R, RL extra

Brilliant Benzo Violet B, 2R
Heliotrope BB
Brown: Benzo Brown MC
Black: Direct Black VT

The dyeing of two-coloured effects.

(For this purpose there are 6 methods in use:)

Recipe 1. The Benzo Colours mentioned in chapter 134, page 111 and chapter 136, page 112 are used in combination with Wool Colours (chapter 137, page 113). The principle in following this method is to employ such Benzo Colours as dye the wool but a little, so that the material may be shaded to any desired tone in the same bath with Wool Colours which work well in a neutral bath.

Recipe 2. Dye the cotton with Diazotisable Colours fast to cross-dyeing in a bath containing Glauber's salt and soda, at as low a temperature as possible, diazotise, develop, and then cross-dye the wool in an acid bath. (See chapter 18, page 19.)

Recipe 3. Dye the wool strongly acid, so that the cotton will remain white. Then rinse and cover the cotton in a cold or lukewarm bath containing Glauber's salt and a little soda. In this way, the most delicate two coloured effects can be produced. (Wool Colours which leave the cotton white, see chapter 79, page 78; such as are fast to alkalies, chapter 74, page 71, and Benzo Colours, chapter 12, page 14.)

Recipe 4. Dye the wool as stated under recipe 3, rinse, treat the cotton with tannic acid and dye with Basic Colours. For dyeing the wool, only such colours should be used as leave the cotton a pure white. In cross-dyeing the cotton the temperature must be kept quite low so that as little basic colour as possible is taken up by the wool.

Recipe 5. (see recipe 4, page 114). Employ Katigen Colours fast to cross-dyeing for dyeing the cotton (see chapter 35, page 37). The wool is dyed in the usual manner. The Wool Colours noted in chapter 79, page 78 are adapted for this purpose.

Recipe 6. Dye the wool with Acid Colours or colours which can be after-chromed, rinse well and then cover the cotton with Katigen Colours in a cold bath. (See recipe 4, page 114.)

Dyeing of half-woollen skirt-borders.

In dyeing this article use Benzo Colours fast to alkalies, as same is chiefly required to possess good resistance against street dirt. (Compare chapter re the dyeing of half-wool with chapter 15, page 17.)

Mercerising of Half-wool.

The machine used for mercerising consists of three wooden vats. The first is iron plated and contains caustic soda of 32—42° Tw. which is cooled down to a temperature of 38—40° Faht. by ice (externally applied) so as to protect the wool as much as possible. The second vat, which the mercerised goods enter after being well squeezed out, contains water acidulated with hydrochloric acid.

Care must be taken that sufficient acid is always present to neutralize any caustic soda still contained in the goods. From numerous experiments it has been ascertained, that if the pieces are acidulated immediately after being treated with caustic soda, the crimp effect is considerably improved. The third vat contains clean water for rinsing. Finally the goods are rinsed for 20 minutes in a hank washing machine which is constantly replenished with fresh water.

The mercerised goods are dyed with Benzo Colours as mentioned in chapter 27, page 27 and with Wool Colours which exhaust in a neutral bath (see chapter 137 and 138, page 113).

140. Acid Wool and Sulphon Colours suitable for dyeing half-wool which is afterwards mercerised.

Red:	Croceine Scarlet 10 B
	Fast Red A
	Rhodamine B, G
Orange:	Croceine Orange G
	Orange GT
Yellow:	Indian Yellow G
Green:	Brilliant Acid Green 6B
	Diamond Green SS
	Fast Green CR
	Acid Green 3B
Blue:	Alkali Blue 2R—4R, 6R extra
	Brilliant Sulphon Azurine R
	Sulphon Azurine D
	Sulphon Cyanine G, GR extra, 3R, 5R extra
	Sulphon Acid Blue B, G, R
	Wool Blue N extra, R extra
Violet:	Alkali Violet LR
	Acid Violet HW
Black:	Diamond Black F, NG
	Naphtaline Acid Black 4B

Phenylamine Black 4B, T
Acid Black 5B
Sulphon Blue Black
Sulphon Black 4BT, R
Wool Black N4B

141. Benzo Colours suitable for dyeing half-wool which is afterwards mercerised.

(See chap. 28, page 29.)

Silk Dyeing.

Preparation of the silk before dyeing.

There are different treatments to which silk is subjected, same depending on the condition in which the dyeing of the silk is desired to be carried out, i. e. whether on the raw silk, souple silk or cuite silk (completely boiled off).

In dyeing raw silk (écru) proceed as follows: Steep the silk for $^1/_2$—1 hour in a warm bath at 85—95° Faht. to which about 5% soda ash has been added, then, without rinsing, work for 1 hour in a fat soap bath at about 75° Faht. In the case of yellow silk, it is advisable to leave same in the soap liquor overnight. Then bleach the yellow silk with aqua regia of about $4^1/_2$° Tw. for $^1/_2$ hour at 75° Faht., expose to the air for a short time, drain well and treat again in the soap bath for about $^1/_2$ hour. After this, wring off and stove overnight in the stoving chamber. To remove the sulphurous acid, it is advisable to aftertreat with soap in a lukewarm bath, to which about 10% hydrogen peroxide, calculated on the weight of the material, has been added.

White silk is not bleached with aqua regia after leaving the soap bath, but stoved immediately in the stoving chamber (best overnight) and then treated with hydrogen peroxide in the same way as yellow silk. After this, the silk is rinsed and dyed.

Souple silk. This silk must possess a soft, bulky, open fibre of a dull gloss. To obtain these characteristics first treat exactly as stated for raw silk, then enter directly after stoving into the soupling bath which is composed as follows:

8—10% tartar cryst.
1% sulphuric acid 169° Tw.
10% sulphurous acid.

Treat the silk in this bath for $^1/_2$—1 hour at 150—195° Faht. By this treatment, th esilk, according to the quality, loses about 8% of its weight. After soupling give several waters and then dye. The addition of tartar may be re-

duced to about 5% when employing the same liquor fo further lots, the percentages of the other ingredients remai unaltered.

The boiling off of the silk is preferably done in soi water free from lime, with an addition of 30—35% gree olive oil soap, calculated on the weight of the goods. Ente the silk at the boil and treat for 1 hour near the boil wit indirect steam. If indirect steam is not available, the bat must be boiled up again after the lapse of ½ hour. It i advisable to limit the treatment in the case of soft silk, o such as easily becomes fluffy, to about 40 minutes.

In order to thoroughly clean the silk from the yellow gun present in same, it is usual to pass the silk again throug a boiling bath prepared with 10% green olive oil soap, say abou three times. After this the silk is hydroextracted and dyed

The boiled off soap resulting from the first process i used for preparing broken boiled off soap baths, whilst th second soap bath through which the silk is given 3 passage can be used to advantage for degumming further lots of silk

Dyeing with Basic Colours.

It is advisable to use distilled water provided with a little acetic acid if necessary to dissolve the colours. Very delicate shades are dyed at 140—175° Faht. in a fresh bath containing olive oil soap so as to ensure as clear a tone as possible. As a rule, however, the silk is dyed in a boiled off soap bath broken with acetic or sulphuric acid.

Should boiled off soap be lacking, then good results can be obtained in a hot scrooping bath, acidulated with acetic or sulphuric acid. Brilliant Green and Methyl Violet are particularly adapted for this method when used for self shades.

142. List of Basic Colours.

(See chap. 46, page 42.)

It is advisable to dye the following colours in a boiled off soap bath broken with acetic acid. In the case of other basic colours sulphuric acid may be used instead of acetic acid.

Red:	Pyronine G
	Rhoduline Scarlet G
Orange:	Rhoduline Orange N
	Coriphosphine O
Yellow:	Auracine G
Blue:	Methylene Blue brands
	New Methylene Blue F, FR
	New Blue D, R extra

143. Basic Colours fastest to water.

Indon Blue RR
New Blue D
Methyl Violet 4B, 6B
New Fast Grey

144. Basic Colours fast to ammonia 20%

Red:	Brilliant Rhoduline Red B
	Pyronine G
	Rhodamine B, G
	Rhoduline Red G
	Saffranine FF extra
Orange:	Chrysoidine G
	Rhoduline Orange N
Yellow:	Auracine G
	Auramine II, O
	Coriphosphine O
	Rhoduline Yellow 6G
Green:	Methylene Green B
Blue:	Methylene Blue brands
	Indon Blue BB, RR
	New Methylene Blue F, FR
Violet:	Crystal Violet P
	Methyl Violet brands
	Rhoduline Heliotrope B, 3B
	Rhoduline Violet.

Dyeing with Acid or slightly Acid dyeing Colours.

Dye the Acid Colours in a boiled off soap bath broken with sulphuric acid except the Eosine Colours which are treated in a bath broken with acetic acid.

145. List of Acid dyeing Colours best adapted for dyeing silk.

Red:	Alizarine Rubinole R
	Azo Eosine.
	Azo Fuchsine B, 6B, G, S
	Azo Crimson S
	Azo Phloxine 2G
	Brilliant Croceine 3B
	Brilliant Ponceau 4R
	Carmoisine B
	Cochineal Scarlet PS

	Croceine Scarlet 1B, 3B, 7B, 10B
	Double Ponceau 4R
	Fast Red A, E, NS
	Acid Magenta
	Eosine brands
	Imperial Scarlet 3B
	Silk Scarlet G, 22925
Orange:	Croceine Orange G
	Fast Light Orange G
	Mandarine G
	Orange 2B
Yellow:	Quinoline Yellow
	Fast Yellow extra
	Fast Light Yellow G, 2G, 3G
	Indian Yellow G, GR, R
	Naphtol Yellow S
	New Yellow extra
	Tartrazine
Green:	Alizarine Cyanine Green E, G extra, 3G, K
	Alizarine Emeraldole G
	Alkali Fast Green 3B, 3G
	Brillant Acid Green 6B
	Fast Green bluish, CR
	Fast Light Green
	Cashmere Green B
Blue:	Alizarine Astrol B, G
	Alizarine Sky Blue B
	Alizarine Sapphirole B, SE
	*Alkali Blue 2B, 6B, 6R extra
	Brilliant Alizarine Cyanine G, 3G
	Brillant Blue extra greenish
	Brilliant Wool Blue B extra, G extra
	Fast Acid Blue B extra
	Induline B
	Intensive Blue
	Night Blue extra greenish
	New Patent Blue 4B, GA
	Silk Blue BES
	Soluble Blue greenish I, reddish I
	Wool Blue N extra, R extra
	Wool Fast Blue BL, GL, RL
Violet:	Alizarine Irisole R
	Alkali Violet LR
	Azo Acid Violet A2B, AL, R extra
	Fast Acid Violet 10 B

* These Alkali Blue brands are dyed in a neutral soap bath and afterwards acidulated with sulphuric acid.

Acid Violet 4B extra, 6BN extra, 6BNB, HW

Black: Naphtaline Acid Black 21455
Naphtylamine Black 4B, 10B
Phenylamine Black 4B
Silk Black 22886
Victoria Black B

146. Acid dyeing Colours fast to ammonia 20%.

Red: Alizarine Rubinole R
Azo Fuchsine 6B
Azo Crimson S
Brilliant Croceine 3B
Croceine Scarlet 1B, 3B, 7B, 10B
Cochineal Scarlet PS
Fast Red A, E
Eosine brands
Imperial Scarlet 3B
Silk Scarlet G, 22925

Orange: Croceine Orange G
Fast Light Orange G
Mandarine G
Orange 2B

Yellow: Quinoline Yellow
Fast Yellow extra
Fast Light Yellow G, 2G
Indian Yellow G, GR, R
Naphtol Yellow S
New Yellow extra
Tartrazine

Green: Alizarine Cyanine Green brands
Alizarine Emeraldole G
Alkali Fast Green 3B, 3G
Fast Green bluish
Fast Light Green
Cashmere Green B

Blue: Alizarine Astrole B, G
Alizarine Sky Blue B
Alizarine Sapphirole B, SE
Brilliant Alizarine Cyanine 3G
Brilliant Wool Blue B extra, G extra
Fast Acid Blue B extra
Intensive Blue
New Patent Blue 4B, GA
Wool Blue N extra, R extra
Wool Fast Blue BL, GL

Violet: Alizarine Irisole R
Alkali Violet LR

Azo Acid Violet A2B, AL
Fast Acid Violet 10B
Acid Violet 4B extra, 6BN extra, 6BNB, HW

Black: Naphtaline Acid Black 21455
Naphtylamine Black 4B, 10B
Silk Black 22886
Victoria Black B

147. Acid dyeing Colours fast to light.

Red: Alizarine Rubinole R
Azo Eosine
Azo Fuchsine 6B, G
Azo Phloxine 2G
Brilliant Croceine 3B
Brilliant Ponceau 4R
Carmoisine B
Cochineal Scarlet P S
Croceine Scarlet 3B, 7B, 10B
Double Ponceau 4R

Red: Imperial Scarlet 3B
Silk Scarlet G, 22925

Orange: Croceine Orange G
Fast Light Orange G
Mandarine G
Orange 2B

Yellow: Quinoline Yellow
Fast Light Yellow G, 2G, 3G
Indian Yellow R

Green: Alizarine Cyanine Green brands

Blue: Alizarine Astrole B, G
Alizarine Sky Blue B
Alizarine Sapphirole B, SE
Brilliant Blue extra greenish
Silk Blue BES
Soluble Blue greenish I, reddish I
Wool Fast Blue BL, GL

Violet: Alizarine Irisole R
Azo Acid Violet A2B, AL, R extra

Black: Naphtaline Acid Black 21455
Naphtylamine Black 4B, 10B
Victoria Black B

Dyeing with Sulphon Colours.

Dye in a boiled off soap bath broken with acetic or sulphuric acid.

148. List of Sulphon Colours.

Red:	Anthracene Red
	Acid Anthracene Red 3B, G
	Cloth Red brands
Orange:	Sulphon Orange G
Yellow:	Sulphon Yellow 5G, R
Green:	Diamond Green B, SS
Blue:	Brilliant Sulphon Azurine R
	Sulphon Azurine D
	Sulphon Cyanine brands
	Sulphon Acid Blue B, R
Black:	Sulphon Cyanine Black B, 2B, 22768
	Sulphon Black G
	Black 23302 Black

149. Sulphon Colours fast to ammonia.

All the above mentioned Sulphon Colours are fast to ammonia.

150. Sulphon Colours fast to light.

Anthracene Red
Cloth Red B, G
Sulphon Yellow 5G, R
Diamond Green B
Sulphon Acid Blue B, R
Sulphon Cyanine Black B, 22768
Black 23302

Dyeing with Benzo Colours.

It is advisable to dye in a boiled off soap bath, broken with acetic or sulphuric acid, or with an addition of 10—20% Glauber's salt and 1—2% acetic acid. Enter into the lukewarm bath, heat slowly up to 195° Fahr. and work for 1 hour at this temperature. Add the acetic acid in several portions so that the Benzo Colour may not rush on too quickly and unevenly. For dark shades, up to 10% acetic acid is added.

151. List of Benzo Colours.

Red:	Benzo Fast Red 9BL, FC, GL, L
	Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
	Benzo Purpurine 1B, 4B, 10B

Benzo Rhoduline Red B, 3B
Benzo Red 10B, 12B, SG
Brilliant Geranine B
Delta Pupurine 5B
Geranine G
Rose Azurine B, G

Orange: Benzo Fast Orange S
Congo Orange RG
Pluto Orange G

Yellow: Benzo Fast Yellow 5GL
Chloramine Yellow FF, GG, W extra
Chrysamine G, R
Chrysophenine G
Thiazole Yellow 3G

Green: Benzo Dark Green B, GG
Benzo Green C, G
Benzo Olive
Brilliant Benzo Green B

Blue: Azo Blue
Benzo Azurine G, 3G, R, 3R
Benzo Blue 2B, 3B, BX, RW
Benzo Cyanine B, R
Benzo Fast Blue G, 5R
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B
Brilliant Fast Blue B, 2G
Brilliant Sky Blue G, 5G
Chicago Blue B, R
Diazo Blue Black
Diazo Black B, R

Violet: Azo Violet
Benzo Fast Violet R
Benzo Violet R, RL extra
Brilliant Benzo Violet B, 2R
Chloramine Violet R
Congo Corinth B, G
Heliotrope BB

Brown: Benzo Brown B, BR, BX, G, GG, 3GC, MC, R extra
Benzo Chrome Brown B, BS, G, 5G, R, 3R
Toluylene Brown B, M

Black: Benzo Fast Black L

152. Benzo Colours fast to water.

Red: Benzo Fast Red GL
Benzo Purpurine 1B
Benzo Red 10B

Rose Azurine B, G
Yellow: Benzo Fast Yellow 5GL
Chloramine Yellow GG, HW
Chrysamine G, R
Thiazole Yellow 3G
Green: Benzo Dark Green B, GG
Benzo Green G
Benzo Olive
Blue: Benzo Fast Blue G
Brilliant Azurine 5G
Brilliant Fast Blue B, 2G
Brown: Benzo Brown 3GC
Benzo Chrome Brown B, G, R

153. Benzo Colours fast to ammonia.

All Benzo Colours on silk are fast to ammonia except:
Brilliant Sky Blue G, 5G

154. Benzo Colours fast to light.

Red: Benzo Fast Red 9BL, FC, GL, L
Benzo Fast Scarlet brands
Benzo Red 10B
Geranine G
Orange: Benzo Fast Orange S
Congo Orange RG
Yellow: Benzo Fast Yellow 5GL
Chloramine Yellow FF, GG, W extra
Chrysamine G
Chrysophenine G
Blue: Benzo Fast Blue G, 5R
Brilliant Fast Blue B, 2G
Violet: Benzo Fast Violet R
Benzo Violet RL extra
Chloramine Violet R
Brown: Benzo Chrome Brown G
Black: Benzo Fast Black L

Dyeing with Diazo Colours.

Dye as prescribed for Benzo Colours, rinse well, diazotise and develop as stated for the dyeing of cotton on pages 1 and 4.

155. List of Diazo Colours.

Red: Diazo Bordeaux 7B
Diazo Brilliant Scarlet B extra, 3B extra, 6B

extra, 2BL extra conc., 5BL extra, G extra
Diazo Rubine B
Primuline Yellow (Dev. A) (Dev. B)

Orange: Diazo Brilliant Orange G
Primuline (Dev. F)

Yellow: Primuline (Dev. J) (soda)

Blue: Diazo Blue 3R
Diazo Navy Blue 3B
Diazo Indigo Blue BR extra, M, 2RL, 3R, 4RL
Diazo Red Blue 3R

Brown: Benzo Brown MC (Dev. A) (Dev. H)
Diazo Brown G (Dev. H)
Diazo Brown R extra (Dev. H) (soda)

Black: Diazo Brilliant Black B (Dev. A) (Dev. B) (soda)
Diazo Fast Black 3B (Dev. A) (Dev. H)
Diazo Fast Black SD (Dev. A) (Dev. H) (Dev. A & F)
Diazo Black B, 2B, 3B, BHN, G, R extra (Dev. A) (Dev. H)

156. Diazo Colours fast to water.

The fastness to water of the developed Diazo colours is, on the average, quite good. As a rule, developer H gives shades faster to water than developer A.

157. Diazo Colours fast to ammonia.

All developed shades of Diazo Colours are fast to ammonia.

158. Diazo Colours fast to light.

Diazo Brilliant Scarlet brands
Primuline Yellow (Dev. F) (Dev. J)
Diazo Indigo Blue BR extra, 2RL, 4RL
Diazo Brilliant Black B extra
Diazo Fast Black SD (Dev. H)
Diazo Black B, 2B, 3B, BHN (Dev. H)

Note: As regards fastness to light, developer H yields better results than developer A.

Dyeing with Katigen Colours.

Dissolve the Katigen Colours with sulphide of soda cryst. as stated on page 32, add this solution to the dye-

bath, then 20—40% common salt and finally, whilst constantly stirring, slowly add 1—1½ times the amount of bilactate of soda as sulphide of soda cryst. employed. For Katigen Black T3B, which yields the finest black shade, use from double to 2½ times the amount of bilactate of soda as sulphide of soda cryst., and it is moreover advisable to add a little Turkey red oil or Monopole soap as well as 5/12—5/6 oz. lime per 10 gallons liquor.

Fancy shades are preferably dyed at 120—140° Fahr., black shades at 175—195° Fahr., for 1 hour on bent iron pipes immersed in the liquor. The bilactate of soda not only neutralises the detrimental effect of the sulphide of soda on the silk, but also aids in exhausting the bath.

Note: Re the preparation of bilactate of soda, look up the dyeing of half-wool, page 114.

159. List of Katigen Colours.

All Katigen Colours are suitable for the dyeing of silk. (See chap. 31, page 36.)

160. Katigen Colours, remarkable for their special fastness to light.

Green:	Katigen Green 2B, 4B, 2BX, 2G
	Katigen Olive G, GN
Blue:	Katigen Blue B
	Katigen Chrome Blue 5G, 2R
	Katigen Dark Blue R extra
	Katigen Indigo B extra, CL extra, CLG extra, G extra, R extra, RL extra, 2RL extra, 5RL extra, 4RO extra, 23990
	Katigen Navy Blue R extra
Violet:	Katigen Violet B
Brown:	Katigen Yellow Brown 5G extra
	Katigen Khaki G extra
	Katigen Red Brown R
	Katigen Black Brown B extra conc., BW extra conc., N extra conc., R extra conc., N
Black:	Katigen Blue Black brands
	Katigen Brilliant Black B extra
	Katigen Black brands
	Katigen Deep Black B

161. Katigen Colours fast to ammonia 20%.

All Katigen Colours are fast to ammonia except:

Katigen Brown 2R, 4R
Katigen Red Brown R, 3R
Katigen Violet B

162. Katigen Colours fast to water alongside white silk and cotton.

All Katigen Colours are fast to water.

163. Katigen Colours fast to washing alongside white silk and cotton.

Green: Katigen Olive G, GN
Blue: Katigen Chrome Blue 5G, 2R (afterchromed)
Katigen Dark Blue R extra
Katigen Indigo R extra, RL extra, 2RL extra
Brown: Katigen Brown V extra
Katigen Chrome Brown 5G (afterchromed)
Katigen Yellow Brown GG, GG extra, 5G extra, GR extra, O extra. R extra
Katigen Khaki G extra
Katigen Black Brown B extra conc., BW extra conc., N extra conc., R extra conc., N
Black: Katigen Blue Black NB extra
Katigen Brilliant Black B extra
Katigen Black brands
Katigen Deep Black B

164. Katigen Colours fast to boiling alongside white silk and cotton.

(The colours were boiled gently for 1 hour with 5/6 oz. neutral soap per gallon water.)

Green: Katigen Olive G, GN
Blue: Katigen Chrome Blue 2R (afterchromed)
Brown: Katigen Brown V extra
Katigen Chrome Brown 5G (afterchromed)
Katigen Yellow Brown GG, GG extra, GR extra, O extra. R extra
Katigen Khaki G extra
Katigen Black Brown B extra conc., BW extra conc., N extra conc., R extra conc.
Black: Katigen Blue Black B extra, NB extra
Katigen Brilliant Black B extra
Katigen Black brands (except Katigen Black T3B)
Katigen Deep Black B

165. Katigen Colours fast to cross-dyeing alongside silk and wool.

The Colours were treated for 1 hour, boiling gently, with an addition of 20% acetic acid.)

Green: Katigen Green 2B
Katigen Olive G, GN

Blue: Katigen Blue B
Katigen Chrome Blue 5G, 2R (afterchromed)
Katigen Dark Blue R extra
Katigen Indigo brands
Katigen Navy Blue R extra

Brown: Katigen Brown 2R, 4R, V extra
Katigen Chrome Brown 5G, (afterchromed)
Katigen Yellow Brown GG, GG extra, 5G extra, GR extra, O extra, R extra
Katigen Khaki G extra
Katigen Red Brown R, 3R
Katigen Black Brown brands

Black: Katigen Blue Black B extra 4B extra
Katigen Brilliant Black B extra
Katigen Black brands
Katigen Deep Black B

166. Katigen Colours fast to stoving alongside white silk and cotton.

Yellow: Katigen Yellow G, GG extra

Green: Katigen Green 2B, 4B, 2BX, 2G
Katigen Olive G, GN

Blue: Katigen Blue B
Katigen Chrome Blue 5G, 2R (afterchromed)
Katigen Dark Blue R extra
Katigen Indigo B, R extra, RL extra, 2RL extra, 5RL extra, 4RO extra, 23990
Katigen Navy Blue R extra

Brown: Katigen Brown 2R, 4R, V extra
Katigen Chrome Brown 5G (afterchromed)
Katigen Yellow Brown GG, GG extra, 5G extra, GR extra, O extra, R extra
Katigen Cutch B
Katigen Red Brown R
Katigen Black Brown brands

Black: Katigen Blue Black B extra, 4B extra, NB extra

Katigen Brilliant Black B extra
Katigen Black brands
Katigen Deep Black B

Dyeing with Mordant Colours.

Directions for dyeing. The silk must be degummed well before mordanting and then be passed through a weak acetic acid bath and hydroextracted.

Alumina Mordant. Dissolve 10 lbs sulphate of alumina free from iron in 5 gallons water, and separately, 2—3 lbs soda cryst. in 1 gallon hot water. Pour the soda solution, when cold, into the alumina solution, whilst constantly stirring; a clear solution 12—15° Tw. is obtained.

Immerse the silk for 4 hours or, better still, overnight in the above mentioned solution, then wash, preferably in the washing-machine, next work in a hot soap bath for 15 minutes (10% soap of the weight of the silk), rinse again and dye in a boiled off soap bath broken with 1—2% acetic acid. Commence dyeing cold, raise the temperature of the liquor quite slowly, and boil for 1 hour.

Chrome Mordant. Immerse the silk for at least 4 hours in a chromium chloride liquor 32° Tw., rinse well and dye immediately afterwards; otherwise proceed the same as prescribed for dyeing on an alumina mordant.

Iron Mordant. Immerse the silk for 4 hours or better still overnight in nitrate of iron (basic sulphate of iron) 32—52° Tw, then wash in the washing-machine; after this pass on to a water bath of 120° Faht. and finally work for about 1 hour near the boil in a very fatty soap bath. Now rinse and dye as stated above.

167. List of Mordant Colours chiefly employed for dyeing on an alumina mordant.

Red:	Alizarine Bordeaux B, G, GG paste.
	Alizarine Purpurine paste
	Alizarine Red 1B extra, SX extra, XGG paste
Orange:	Alizarine Orange R paste
Yellow:	Anthracene Yellow paste, C powder
	Chrome Yellow R extra
	Diamond Flavine G
Green:	Alizarine Cyanine Green E, G extra, 3G paste
	Alizarine Viridine paste
	Coeruleine S paste
Blue:	Alizarine Blue GG double, GW double, R double, S extra paste

Alizarine Cyanine BBS powder, G extra, GG, ND extra, R extra, 3R double, WB, WRB, WRR paste.
Brilliant Alizarine Cyanine 3G paste
Chrome Blue paste
Celestine Blue

Violet: Alizarine Heliotrope R paste
Galleine paste

Brown: Anthracene Brown G, R, W paste

Black: Alizarine Cyanine Black G paste

168. Mordant Colours fast to water when dyed on an alumina mordant.

Red: Alizarine Bordeaux B, G, GG paste
Alizarine Red brands (paste)

Orange: Alizarine Orange R paste

Yellow: Anthracene Yellow paste, C powder

Green: Coeruline S paste

Blue: Alizarine Blue GG double, GW double, R double, S extra paste
Alizarine Cyanine brands
Chrome Blue paste

Violet: Galleine paste

Brown: Anthracene Brown G, R, W paste

Black: Alizarine Cyanine Black G paste

169. Mordant Colours fast to ammonia when dyed on an alumina mordant.

All shades on an alumina mordant are fast to ammonia except the Alizarine Red brands.

170. Mordant Colours fast to light when dyed on an alumina mordant.

All Mordant Colours dyed on an alumina mordant are fast to light except:

Anthracene Yellow paste
Alizarine Blue brands
Chrome Blue paste
Alizarine Cyanine G extra, GG, WB paste
Anthracene Brown G, R, W paste

171. Mordant Colours chiefly used for dyeing on a chrome mordant.

Red: Alizarine Bordeaux B, G, GG paste
Alizarine Purpurine paste
Alizarine Red 1B extra, SX extra, XGG paste

Yellow: Alizarine Yellow 3G powder
Anthracene Yellow paste, C powder
Chrome Yellow R extra powder
Diamond Flavine G powder

Green: Alizarine Cyanine Green E, G extra, 3G paste
Alizarine Viridine FF paste
Coeruline S paste

Blue: Alizarine Blue GG double, GW double, R double, S extra paste
Alizarine Cyanine BBS powder, G extra, GG, ND extra, R extra, 3R double, WB, WRB, WRR paste
Alizarine Sapphirole SE paste
Brilliant Alizarine Cyanine 3G paste
Chrome Blue paste
Celestine Blue B powder
Gallo Cyanine paste

Violet: Alizarine Heliotrope R paste
Chrome Violet paste
Galleine paste

Brown: Alizarine Orange R paste
Anthracene Brown R paste

Black: Alizarine Cyanine Black G paste
Alizarine Fast Grey paste

172. Mordant Colours fast to water when dyed on a chrome mordant.

Red: Alizarine Bordeaux B, G, GG paste

Yellow: Anthracene Yellow paste, C powder
Diamond Flavine G powder

Green: Coeruline S paste

Blue: Alizarine Blue brands
Alizarine Cyanine brands paste, BBS powder

Violet: Alizarine Heliotrope R paste
Galleine paste

Brown: Alizarine Orange R paste
Anthracene Brown R paste

Black: Alizarine Cyanine Black G paste
Alizarine Fast Grey paste

173. Mordant Colours fast to ammonia when dyed on a chrome mordant.

With the exception of the Alizarine Red brands, all Mordant Colours are fast to ammonia when dyed on a chrome mordant.

174. Mordant Colours fast to light when dyed on a chrome mordant.

All Mordant Colours on a chrome mordant are fast to light except:

Chrome Blue
Celestine Blue B
Alizarine Cyanine GG
Gallo Cyanine

175. Mordant Colours chiefly employed for dyeing on an iron mordant.

Red:	Alizarine Bordeaux B, G, GG paste
	Alizarine Purpurine paste
	Alizarine Red 1 B extra, SX extra, XGG paste
Yellow:	Alizarine Yellow R powder
	Anthracene Yellow paste, C powder
	Chrome Yellow R extra powder
	Diamond Flavine G powder
Green:	Alizarine Cyanine Green E, G extra, 3G paste
	Alizarine Viridine FF paste
	Coeruline S paste
Blue:	Alizarine Blue R double, S extra paste
	Alizarine Cyanine GG, R extra, 3R double paste
	Chrome Blue paste
Violet:	Galleine paste
Brown:	Alizarine Orange R paste
	Anthracene Brown R paste

176. Mordant Colours fast to water when dyed on an iron mordant.

Red:	Alizarine Bordeaux B, G, GG paste
	Alizarine Purpurine paste
	Alizarine Red brands paste
Yellow:	Anthracene Yellow paste, C powder
Green:	Coeruline S paste

Blue:	Alizarine Blue R double, S extra paste
	Alizarine Cyanine R extra, 3R double past
Violet:	Galleine paste
Brown:	Anthracene Brown R paste

177. Mordant Colours fast to ammonia when dyed on an iron mordant.

With the exception of Anthracene Yellow paste, al shades on an iron mordant are fast to ammonia.

178. Mordant Colours fast to light when dyed on an iron mordant.

Red:	Alizarine Bordeaux B, G, GG paste
	Alizarine Purpurine paste
	Alizarine Red brands paste
Yellow:	Anthracene Yellow paste, C powder
Green:	Coeruline S paste
Blue:	Alizarine Cyanine R extra, 3R double paste
Brown:	Alizarine Orange R paste
	Anthracene Brown R paste

One-bath process for Mordant Colours.

Add the well dissolved colour and 2—5% formic acid to the dyebath which should be at 100° Faht., enter the material, bring slowly to the boil and boil for 1 hour. Should the bath not exhaust sufficiently, add more formic acid. After this treat in the same bath or in a fresh one containing bichrome for $^1/_2$—$^3/_4$ hour, boiling gently. As regards the proper amount of bichrome see remarks on the dyeing of wool, pages 96 & 97.

179. List of Mordant Colours.

Red:	Alizarine Red PS, W
	Anthracene Red
	Acid Anthracene Red G, 3B
	Cloth Red B, 3B extra, G, 3G extra
Yellow:	Anthracene Yellow C
	Chrome Yellow D, DF, G, R extra
	Diamond Flavine G
Green:	Alizarine Cyanine Green E, G extra, 3G, K
	Diamond Green B, SS
Blue:	Alizarine Cyanine BBS, GG, RR, WRR, WRS

Brilliant Alizarine Blue G, R, 3R
Brilliant Alizarine Cyanine 3G
Chrome Cyanine G, R, T
Diamond Blue 3B, R

Brown: Alizarine Orange R
Acid Anthracene Brown G, R, RH extra, T, VT, W
Acid Chrome Brown T

Black: Alizarine Blue Black B, 3B
Alizarine Fast Black SP
Diamond Black F, FB, GA, NG, NR, PV, P2B, PVB
Acid Chrome Black RH, TC

The shades possess fastness to water and light.

Weighted Silk.

Expensive silk is often weighted, so as to produce a cheaper quality. The charging of the silk is effected with stannic chloride, phosphate of soda and silicate of soda (phosphate silicate charge), for fancy shades, and with tannic acid, sumac extract, cutch, stannic chloride, chestnut extract, gallic extract, etc. for blacks.

On the whole, those colours which are used for dyeing unweighted silk are also adapted for dyeing the weighted material.

Half-silk. (Silk and cotton.)

Dyeing with Benzo Colours.

As far as possible, only soft water (condensed water) should be employed for the dyeing of half-silk, in order to avoid the formation of lime spots on the goods. Hard water must therefore be made soft before using; this is done by boiling up with soap and a little soda, and skimming off the lime soap which rises to the surface of the liquor.

The heating of the liquors with closed steam coils prevents the volume of liquor being increased. As a rule, the volume of liquor is 20:1 of goods, but varies according to the depth of shade required. Light shades turn out more level in long liquors, whereas dark shades are preferably dyed in short liquors, on account of the better exhaustion of the bath.

Among the ingredients usually employed for the dyeing of half-silk, Glauber's salt and common salt assist best in exhausting the bath; additions of alkalies, such as soap or soda, retard the exhaustion and thus facilitate the level dyeing at the same time lessening the affinity of the silk for the colour. Since soda when used at a high temperature, has a detrimental effect on silk same must only be added in very small quantities. The proportions depend on the depth of shade required; employ

5—40 % Glauber's salt cryst.
5—20 % olive oil soap,

and, to produce a good white silk effect,

1—5 % soda cryst.
5—20 % olive oil soap.

Prepare the bath with the necessary ingredients, raise to the boil, add the well dissolved colour through a sieve and enter the goods after turning off steam. The dyeing is carried out for 1—1¼ hours. For light shades. the temperature should not exceed 140° Faht.

After dyeing rinse lukewarm, preferably with the addition of a little soda, so as to remove all traces of soap, and finally wash in one or several cold waters.

The first bath does not exhaust completely and therefore if possible a standing bath should be used. Further lots of goods will then require according to the volume of the liquor, an addition of $^3/_5$—$^3/_4$ of the original amount of colour. As regards Glauber's salt and soda, it is only necessary to replenish the bath with such amounts as have been lost by taking out the goods. It is not advisable to preserve the standing bath too long on account of the gradual decomposition of the soap.

80. Benzo Colours which dye silk and cotton an almost uniform shade, in a bath prepared with Glauber's salt and soap.

Red:	Benzo Fast Red FC, L
	Benzo Purpurine 1B, 4B, 6B
	Benzo Red 10B
	Delta Purpurine 5B
	Geranine G
	Rose Azurine. B, G
Orange:	Congo Orange G, R
	Pluto Orange G
	Toluylene Orange G
Yellow:	Benzo Fast Yellow 5GL
	Chloramine Yellow M, W extra
	Chrysamine G, R
	Chrysophenine G
	Thiazole Yellow 3G
Green:	Benzo Dark Green B, GG
	Benzo Green C
	Brilliant Benzo Green B
Blue:	Benzo Blue RW
	Brilliant Fast Blue B
Violet:	Chloramine Violet R
Brown:	Benzo Brown D3G extra, 5R
	Pluto Brown GG
Black:	Diazo Black 2B (Dev. A) (Dev. H)
	Direct Deep Black E extra, EW extra, RW extra (Dev. A) (Dev. H)
	Pluto Black BS extra, TG extra

181. Benzo Colours which dye the cotton a deeper shad than the silk, in a bath prepared with Glauber's salt and soap.

Red:	Benzo Fast Red 9BL, GL
	Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
	Benzo Purpurine 10B
	Benzo Rhodufine Red B, 3B
	Benzo Red 12B, SG
	Brilliant Congo R
	Brilliant Geranine B
	Brilliant Purpurine R
	Congo Red
	Diazo Rubine B (Dev. A)
Orange:	Benzo Fast Orange S
	Toluylene Orange R
Yellow:	Chloramine Yellow C, FF, HW
	Thiazole Yellow G, GL, R
	Chrysophenine R
Green:	Benzo Green BB, G
Blue:	Benzo Cyanine B
	Benzo Fast Blue B, BN, R
	Benzo Sky Blue 4B
	Brilliant Azurine 5G
	Chicago Blue B, R
	Congo Blue 2B
Violet:	Azo Violet
	Benzo Violet R, RL extra
	Benzo Fast Violet R
Brown:	Benzo Brown MC, RC
	Benzo Dark Brown extra
	Direct Fast Brown B
	Pluto Brown R
	Toluylene Brown B, M
Black:	Diazo Black BHN (Dev. H)
	Pluto Black A extra, 3B extra, CF extra, CR, F extra, FR

182. Benzo Colours which dye the cotton a deep shade but leave the silk a pure or almost a pure white in a bath prepared with Glauber's salt and soap.

Red:	Benzo Fast Pink 2BL
	Chloramine Red 8BS
	Diazo Bordeaux 7B (Dev. A)

Orange:	Chloramine Orange G
Yellow:	Chloramine Yellow GG
	Direct Yellow R, R extra
Blue:	Benzo Blue 2B, 3B
	Benzo Chrome Black Blue B
	Benzo Cyanine 3B
	Benzo Fast Blue G, 5R
	Benzo Sky Blue
	Benzo Red Blue G
	Brilliant Azurine B
	Brilliant Benzo Blue 6B
	Diazo Blue Black
	Diazo Black BHN
Grey:	Benzo Chrome Black B
	Pluto Black G

3. Benzo Colours which dye the silk a deeper shade on the cotton, in a bath prepared with Glauber's salt and soap.

Red:	Congo Rubine
	Hessian Purple N
Brown:	Benzo Brown B, BR, BX, G, GG, 3GC, NB, NBR, NBX, R extra
	Benzo Chrome Brown 5G
Black:	Benzo Fast Black

4. Benzo Colours which dye the silk a different shade on the cotton, in a bath prepared with Glauber's salt and soap.

Red:	Benzo Bordeaux 6B
	Congo Corinth B, G
Orange:	Benzo Orange R
	Orange TA
Green:	Benzo Olive
Blue:	Azo Blue
	Benzo Azurine G, 3G, R, 3R
	Benzo Blue BX, 2R, 4R
	Benzo Cyanine R
	Benzo Copper Blue B, 2B
	Brilliant Azurine R, 2R, 5R
	Brillant Fast Blue 2G
	Diazo Black B, 3B, R
Violet:	Brilliant Benzo Violet B, 2R
Brown:	Benzo Brown NB, NBR, NBX
	Benzo Chrome Brown B, BS, CR, G, R, 3R

Chloramine Brown G
Diazo Brown G
Direct Bronze Brown
Direct Fast Brown GG
Black; Benzo Fast Black
Direct Blue Black B, N
Direct Black VT

185. Benzo Colours which leave the silk a pure white or almost white, in a bath prepared with soda and soap.

Red: Benzo Fast Pink 2BL
Benzo Fast Red GL
Benzo Fast Scarlet 4BA, 8BA, 4BS, 5BS, 8BS, GS
Benzo Purpurine 10B
Benzo Rhoduline Red B
Benzo Red SG
Brilliant Congo R
Brilliant Geranine B
Chloramine Red 8BS
Orange: Benzo Fast Orange S
Chloramine Orange G
Yellow: Chloramine Yellow C, FF, GG, HW
Direct Yellow R, R extra
Blue: Benzo Blue 2B, 3B
Benzo Chrome Black Blue B
Benzo Cyanine B, 3B
Benzo Fast Blue B, BN, G, R, 5R
Benzo Sky Blue 4B
Benzo Red Blue G
Brilliant Azurine B, 5G
Brilliant Benzo Blue 6B
Chicago Blue B, R
Congo Blue 2B
Diazo Black BHN
Violet: Azo Violet
Brown: Toluylene Brown M
Grey; Pluto Black CR, G

186. Acid and slightly acid dyeing colours which are adapted for shading the silk and which leave the cotton white or nearly so, in a lukewarm, weak, acetic acid bath.

Red: Croceine Scarlet R
Rhodamine B, G

Orange: Croceine Orange G, R
Yellow: Quinoline Yellow
Fast Light Yellow G
Sulphon Yellow 5G, R
Green: Alkali Fast Green 3B, 3G
Fast Green bluish
Acid Green BB extra, BBN extra, GB extra, GG extra
Wool Green BS
Blue: Alizarine Sky Blue B
Cotton Blue VI
Intensive Blue
Wool Blue N extra, R extra, SR extra
Violet: Alizarine Irisole R
Fast Acid Violet 10B
Acid Violet 5B, 6BN, BW, 4RS

187. Acid and slightly acid dyeing colours which, in shading the silk under the same conditions as previously stated, dye the cotton more or less.

Red: Azo Eosine
Brilliant Croceine 3B
Croceine Scarlet 1B—10B
Fast Red A
Eosine 1 bluish, S extra bluish
Metanil Red 3B
Acid Anthracene Red G
Imperial Scarlet B, 3B
Scarlet R
Orange: Mandarine G
Orange 11B, GT, RO
Sulphon Orange G
Yellow: Indian Yellow G, GR, R
Metanil Yellow
Naphtylamine Yellow
Green: Alizarine Cyanine Green G extra
Brilliant Acid Green 6B
Fast Green CR
Blue: Alkali Blue B, R, 2R, 3R, 4R
Cotton Blue 1, 11
Brilliant Blue extra greenish
Brilliant Wool Blue G extra
Silk Blue BES
Soluble Blue greenish 1, reddish 1
Wool Fast Blue BL, GL, RL
Violet: Alkali Violet LR

Azo Acid Violet A2B, AL, 4R
Acid Violet 4B extra, 7B, 8B extra, 4BN extra, 6BN extra, 6BNB, HW, R extra

Dyeing with Basic Colours.

Dye cold or lukewarm, in a bath slightly acidulated with acetic acid. The silk is always dyed a considerably deeper shade than the cotton.

The following Basic Colours leave the cotton almost white:

Pyronine G
Rhodamine B, G
Rhoduline Scarlet G
Auramine O, II
Rhoduline Yellow 6G
New Blue R extra

188. List of Basic Colours.

(See chapter 46, page 42)

Dyeing with Katigen Colours.

The dissolving of the Katigen Colours and the preparation of the dyebath is the same as stated for the dyeing of silk on page 133. Fancy shades are dyed at 120—140° Faht., black at 175—195° Faht. As when dyeing at a high temperature the silk is dyed deeper than the cotton, while at a low temperature the cotton is dyed a deeper shade than the silk, it will be easily understood that uniform shades on both fibres depend chiefly on a proper regulation of the temperature of the liquor.

Among the black Katigen Colours, Katigen Black T3B is best adapted for this class of goods, as it dyes the silk deeper than any other brand. In order to dye the cotton just as deep or even deeper, the T3B brand is used in combination with Katigen Black TW extra or WR extra.

189. List of Katigen Colours.

All Katigen colours (except the Katigen Indigo brands, which dye the silk somewhat deeper than the cotton, dye both fibres uniformly. For the properties of these colours see pages 36—39 and 128—131.

The dyeing of two-coloured effects on half-silk.

The most popular methods are the following:

Recipe 1. First dye the silk in a strongly acid bath at about 160° Faht. with Acid dyeing wool colours which leave

the cotton white. (See chapter 145, page 121 and dyeing of Half-silk chapter 186, page 142.) Then rinse well, mordant the cotton in a cold bath with tannic acid and tartar emetic and cross-dye with Basic Colours (see dyeing of cotton pages 41—42). When bright effects are desired it is advisable to work in a bath containing as much tannic acid as possible, as an ample amount of tannic acid considerably reduces the tendency of the Basic Colours to be taken up by the silk.

The dyeing is carried out with an addition of 1—2% acetic acid or hydrochloric acid at a very low temperature, so that the silk is affected as little as possible.

Recipe 2. Dye the silk with Wool Colours as stated in recipe I, rinse and cross-dye the cotton with Benzo Colours and an addition of 5—20% soap and 1—5% soda cryst., at as low a temperature as possible.

(For suitable Benzo Colours see chapter 12, page 14 and chapter 185, page 142.)

Recipe 3. Dye the cotton at about 100—120° Faht. with Benzo Colours which are fast to acetic acid and leave the silk white or nearly so. Then cross-dye the silk in a lukewarm bath containing acetic acid, with Acid Colours which do not dye the cotton. (For Benzo Colours see chapter 182, page 140, and chapter 185, page 142; for Acid Colours see chapter 186, page 142,)

Recipe 4. First dye the cotton at about 120° Faht. in a bath containing soap and soda with Benzo Colours which leave the silk undyed, and then the silk with neutral dyeing Wool Colours which do not dye the cotton.

(Suitable Benzo Colours will be found in chapter 185, page 142; Wool Colours in chapters 137 & 138, page 113.)

Recipe 5. Dye the cotton with Katigen Colours and an addition of caseine, so that the silk will remain white. (See remarks on the dyeing of cotton material with white or coloured silk effects, page 35 and chapter 42, page 39.) Then cross-dye the silk with Acid, Benzo, or Basic Colours and an addition of acetic acid, at as low a temperature as possible.

The Acid Colours are the best adapted for this purpose (Chapter 145, page 121); the Benzo and Basic Colours are more liable to go on to the cotton previously dyed with Katigen Colours.

The dyeing of half-silk material in which the silk has to remain white.

(See dyeing with Katigen Colours page 35 and chapter 42, page 39, as well as remarks re dyeing of Half-silk chapter 185, page 142.)

Wool-silk Unions.

The Acid and Basic Colours are the best adapted for the dyeing of silk-unions, and after these the Substantive Colours.

Dyeing with Acid Colours.

Dye for an hour near the boil with an addition of 5—10% Glauber's salt and 1½—3% sulphuric acid, rinse and dry. Those colours which have to be boiled to cover the wool sufficiently are denoted with an asterisk.

The Alkali Blues are dyed for 1 hour at 175—195° Faht. with an addition of 10% borax, rinsed and acidulated.

190. Acid Colours which dye the silk and wool a similar or almost a similar shade.

Red:	Alizarine Rubinole R
	Bordeaux BX, extra, G
	Croceine Scarlet 8B
	Fast Acid Magenta B
	Metanil Red 3B
	Orseilline BB
	Imperial Scarlet B, 3B
Yellow:	Quinoline Yellow
	Fast Light Yellow G
	Indian Yellow G
Green:	Alkali Fast Green 3B*, 3G
	Brilliant Acid Green 6B
	Fast Green, bluish, extra, extra bluish, CR
	Fast Light Green
Blue:	Alkali Blue 1—4B, 7B, 1R, 3R, 6R extra
	*Brilliant Wool Blue B extra, G extra
	Soluble Blue greenish 1, reddish 1
	*Wool Blue N extra, R extra, SR extra
	Wool Fast Blue BL, GL, RL

Violet: Alkali Violet LR, R
Fast Acid Violet 10B
Acid Violet 4B extra, 7B, 8B extra, 4BN extra, 6BN, 6BN extra, BW, HW, R extra

Black: Gloria Black B, N
Naphtaline Acid Black 4B
Naphtylamine Black 4B
New Victoria Black B
Phenylamine Black 4B, T
Phenyl Blue Black N
Black 22768, 23049
Sulphon Cyanine Black B, 2B
Victoria Black B
Wool Black N4B

191. Acid Colours which dye the silk a lighter shade than the wool.

Red: Azo Cochineal
Azo Eosine
Brilliant Croceine 3B
Carmoisine B
Cochineal Scarlet PS
Croceine Scarlet brands
Fast Red A, BT, E, NS
Double Ponceau 1R—4R
Eosine 1 bluish, S extra bluish
Crystal Ponceau 6R
Ponceau R, 2R, 3R
Scarlet R

Orange: Croceine Orange G, R
Fast Light Orange G
Mandarine G
Orange IIB, GT, RO

Yellow: Fast Yellow extra
Fast Light Yellow 2G, 3G
Golden Yellow
Indian Yellow R
Metanil Yellow
Naphtol Yellow S
Naphtylamine Yellow
New Yellow extra conc
Tartrazine

Green: Parrot Green
Acid Green extra, BB extra, 3B, BBN extra, GB extra, GG extra
Wool Green BS

Blue:	Alizarine Astrol B
	Alizarine Sky Blue B
	Alizarine Sapphirole SE
	Brilliant Alizarine Cyanine 3G
	Fast Acid Blue B, B extra
	Intensive Blue B
	New Patent Blue B, 4B, GA
	Victoria Navy Blue DK
Violet:	Alizarine Irisole R
	Azo Acid Violet AL, R extra, 4R
	Victoria Violet 4BS
Brown:	Cashmere Brown V
Black:	Cashmere Black 3BN, 3BX, T
	Naphtol Black 2B
	Acid Black 5B

192. Acid Colours which dye the silk a deeper shade than the wool.

Red:	Acid Anthracene Red 3B
Blue:	Alkali Blue 5B, 6B
	Red Blue extra conc.
	Silk Blue BES
	Soluble Blue 3B extra greenish, TRG
Violet:	Acid Violet 5B, 3R

193. Acid Colours which dye the silk a different shade from the wool.

Red:	Eosine S extra yellowish
Green:	Cashmere Green B
Blue:	Anthra Cyanine BL, DL, FL
	Victoria Navy Blue B
Violet:	Acid Violet 4RS
Black:	Cashmere Black B, 6B
	Naphtylamine Black 4BK
	Acid Black 4BL, LD

194. Acid Colours which leave the silk white or nearly so.

Dye in a boiling bath with an addition of 10—20% acetic acid. To improve the white it is advisable to work the goods, after being rinsed, for $^1/_2$ hour at 105° Faht. in a bath containing wheat bran. After rinsing acidulate with acetic acid.

Red: Azo Cochineal
Azo Fuchsine B, 6B, G. S
Azo Crimson L, S
Azo Phloxine 2G
Cochineal Scarlet PS
Fast Red NS
Acid Magenta
Yellow: Fast Yellow extra
Fast Light Yellow 3G
Metanil Yellow
Naphtol Yellow S
Tartrazine
Blue: Alizarine Sapphirole B, SE
Anthra Cyanine 3FL
Violet: Azo Acid Violet A2B, AL
Victoria Violet 4BS
Black: Azo Fuchsine G (chromed)
Acid Chrome Black WS (chromed)

195. Acid Colours which dye the silk well in a cold acetic acid bath, but the wool only slightly.

Dye in a cold bath for $^1/_2$—$^3/_4$ hour with an addition of 5% acetic acid, rinse and dry.

Rhodamine B, G
Alkali Violet LR
Acid Violet 4B extra, 5B, 7B, 8B extra, 6BN, HW, R extra, 3R

Dyeing with Basic Colours.

Dissolve the colours in the usual way with acetic acid and dye near the boil without any further addition.

196. Basic Colours which dye the silk and the wool the same or almost the same shade.

Red: Diamond Fuchsine
New Magenta
Orange: Chrysoidine G
Yellow: Rhoduline Yellow 6G
Blue: Methylene Blue brands
New Methylene Blue F, FR
New Victoria Blue B
Victoria Blue B
Violet: Crystal Violet P
Methyl Violet brands
Rhoduline Heliotrope B, 3B

197. Basic Colours which dye the silk a deeper shade than the wool.

Red:	Brilliant Rhoduline Red B
	Rhodamine B, G
	Rhoduline Red G
	Saffranine FF extra
Yellow:	Auracine G
	Auramine O, II
Green:	Brilliant Green cryst.
	China Green cryst.
Blue:	Rhoduline Sky Blue BB
	Turquoise Blue BB, G
Violet:	Rhoduline Violet
Brown:	Bismarck Brown F. R extra

198. Basic Colours which dye the silk well in a cold acetic acid bath but the wool only slightly.

Red:	Brilliant Rhoduline Red B
	Rhoduline Red G
	Saffranine FF extra
Green:	Brilliant Green cryst.
	China Green cryst.
Blue:	Methylene Blue BB
	New Blue D
	Rhoduline Blue R
	Rhoduline Sky Blue BB
	Turquoise Blue BB, G
Violet:	Rhoduline Heliotrope B, 3B
	Rhoduline Violet

Dyeing with Sulphon Colours.

Dye near the boil in a neutral or weak acetic acid bath with an addition of 10—20% Glaubers salt and, if necessary, a little acetic acid.

199. Sulphon Colours for dyeing wool-silk.

Red:	Anthracene Red
	Acid Anthracene Red 3B, G
Orange:	Sulphon Orange G
Yellow:	Sulphon Yellow 5G, R
Green:	Diamond Green SS (Wool deeper)
Blue:	Sulphon Cyanine G, GR extra 3R, 5R extra
Black:	Sulphon Blue Black
	Sulphon Cyanine Black B, 2B
	Sulphon Black 4BT

Dyeing with Benzo Colours.

Dye for 1 hour at the boil with an addition of 5—20% Glauber's salt. Some Benzo Colours require an addition of 2—4% acetic acid; such colours are marked with an asterisk in the following lists.

200. Benzo Colours which dye the wool and the silk the same or almost the same shade.

Red: Benzo Fast Red FC, GL, L
Benzo Fast Scarlet 5BS, 8BS, GS
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Red 12B, SG*
Brilliant Congo R
Brilliant Purpurine R
Chloramine Red 8BS
Congo Red
Delta Purpurine 5B
Hessian Purple N
Rose Azurine B, G

Orange: Benzo Fast Orange S
Benzo Orange R
Congo Orange G, R
Orange TA
Pluto Orange G

Yellow: Chrysamine G, R
Chrysophenine G, R
Thiazole Yellow 3G, GL

Green: Benzo Dark Green B, GG
Benzo Green C

Blue: Azo Blue
Benzo Azurine G, 3G, R, 3R
Benzo Blue BX*, 2R, 4R, RW
Benzo Cyanine B, 3B*, R
*Benzo Fast Blue BN, G
Benzo Copper Blue B, 2B
Benzo Sky Blue 4B
Brilliant Azurine B, R, 2R, 5R
Brilliant Sky Blue G, 5G
Chicago Blue B
Congo Blue 2B
Diazo Blue Black
Diazo Black B, 3B, BHN, R extra*

Violet: Azo Violet
Congo Corinth B, G

Brown: Benzo Brown B, BR, BX, G, GG, MC, NB, NBR, NBX, R extra, RC, 5R

Benzo Chrome Brown B, BS, G, 5G, R, 3R
*Direct Bronze Brown
Direct Fast Brown B
Pluto Brown R
Toluylene Brown B, M

Black: *Diazo Black 2B
*Direct Blue Black B, N.
Direct Deep Black E extra, EW extra, RW extra
Pluto Black A, A extra, 3B extra, CF extra, CR, F extra, FR, SS extra, TG extra, TG extra conc.
Silk Black 22886

201. Benzo Colours which dye the silk a deeper shade than the wool.

Red: *Benzo Red 10B
Benzo Rhoduline Red 3B

Yellow: Chloramine Yellow C, FF, HW*, M
Thiazole Yellow G, R

Green: Benzo Olive
Brilliant Benzo Green B

Blue: *Benzo Chrome Black Blue B
Benzo Black Blue R
Brilliant Azurine 5G
Diazo Blue Black

Violet: Benzo Violet R
Chloramine Violet R

Brown: Benzo Brown D3G extra, 3GC
Chloramine Brown M

Grey: Benzo Chrome Black B, N

202. Benzo Colours which dye the wool a deeper shade than the silk.

Red: *Benzo Bordeaux 6B
*Benzo Fast Red 9BL
Benzo Fast Scarlet 4BS
Congo Rubine
Geranine G

Orange: Toluylene Orange G, R

Blue: *Benzo Blue 2B, 3B
Benzo Fast Blue B, R, 5R
Benzo Red Blue G

Violet: Benzo Violet RL extra
*Heliotrope BB

Grey: Benzo Fast Black

203. Benzo Colours which dye the silk a different shade from the wool.

Green: Benzo Green BB, G
Blue: Brilliant Fast Blue B, 2G
Chicago Blue R
Violet: Benzo Fast Violet R
Brown: Benzo Dark Brown extra
Diazo Brown G
Direct Fast Brown GG
Pluto Brown GG, NB

Two-coloured effects on wool-silk.

Two-bath process. Dye the wool as stated in chapter 194, page 148, and then cross-dye the silk (chapter 195, page 149 and chapter 188, page 144).

One-bath process. Prepare the bath with 10—20 % acetic acid and the necessary Acid or Basic Colour, enter the material at 85—105° Faht., bring slowly to the boil, boil until the wool is dyed deep enough, and then work with turned off steam. The shading of the silk with Basic Colours is carried out under the boil. It may be accepted as a general rule that the wool is dyed more deeply at the boil, the silk at a low temperature.

Still clearer effects are obtained by first dyeing with the Wool Colour at the boil and then turning off steam and dyeing the silk with Basic Colours as the temperature falls. (Wool Colours chapter 194, page 148, Basic Colours chapters 197 and 198 page 150).

Dyeing unions consisting of silk, wool and cotton.

Solid shades can be obtained on such material with Benzo Colours in combination with neutral dyeing Wool Colours. Add 10—30 % Glauber's salt cryst. (according to the depth of the shade required), enter the goods at 120—140° Faht., bring to the boil after $^1/_4$ hour, boil for about 10 minutes, then work with turned off steam. The cotton and silk will be sufficiently covered at a temperature of 155—175° Faht., but the wool must be treated at the boil. Solid shades therefore chiefly depend on a proper regulation of the temperature of the bath. (For suitable Benzo Colours see "Dyeing of Half-silk" chapter 180, page 139; for Wool Colours see "Dyeing of Half-wool" chapters 137 and 138, page 113.)

Artificial silk.

Among the various kinds of artificial silk there are only two marketed, as yet, in large quanties:

1. Chardonnet silk, an artificial silk produced from nitro cellulose and partly denitrated again.
2. Glanzstoff, a pure cellulose separated by means of suitable precipitating agents from a solution of cotton in cupric oxide and ammonia.

Especially the Basic, the Benzo and the Katigen Colours come into consideration for the dyeing of artificial silk. It is as a rule dyed in a fairly long liquor (40—50 : 1 of goods). The temperature of the liquor should not exceed 115—120° Faht. for Chardonnet silk and above 140—150° Faht. for Glanzstoff, in exceptional cases the temperature for the latter may be increased to 175° Faht. The dyeing process usually lasts $^1/_2$—1 hour.

Chardonnet silk.

204. Basic Colours for dyeing Chardonnet silk.

Chardonnet silk, in contradistinction to Glanzstoff, is dyed direct with Basic colours without being previously mordanted. Dye at a temperature of 115—120° Faht. with an addition of a little acetic acid. When previously mordanted with tannic acid and tartar emetic, however, considerably fuller shades are obtained, which moreover in comparison with those produced on the unmordanted material possess better fastness to light and greatly increased fastness to water and rubbing. This is the method preferably employed when very full shades are desired. All the Basic Colours mentioned in chapter 46, page 42, excepting:

Cotton Blue brands
Night Blue extra greenish
Jute Black B

are adapted for the dyeing of unmordanted Chardonnet silk.

The above are however adapted for dyeing mordanted material.

205. Benzo Colours for dyeing Chardonnet silk.

Add to the bath, according to the depth of shade required, 5—15% Glauber's salt, enter the goods lukewarm and warm up to 115—120° Faht.

Red: Benzo Bordeaux 6B
Benzo Fast Pink 2BL
Benzo Fast Red 9BL, GL, L
Benzo Purpurine 1B, 4B, 6B, 10B
Benzo Rhoduline Red B, 3B
Benzo Red 10B, 12B, SG
Brilliant Congo R
Brilliant Geranine B
Brilliant Purpurine R
Chloramine Red 8BS
Congo Corinth B, G
Congo Red
Congo Rubine
Delta Purpurine 5B
Geranine G
Hessian Purple N
Rose Azurine G

Orange: Benzo Fast Orange S
Benzo Orange R
Congo Orange G, R
Orange TA
Pluto Orange G
Toluylene Orange G, R

Yellow: Chloramine Yellow FF, M, W extra
Chrysamine G, R
Chrysophenine G, R
Thiazole Yellow G, 3G, GL, R

Green: Benzo Dark Green B, GG
Benzo Green C
Benzo Olive

Blue: Azo Blue
Benzo Azurine G, 3G, R, 3R
Benzo Blue 2B, 3B, BX, 2R, 4R, RW
Benzo Chrome Black Blue B

Benzo Fast Blue B, BN, R, 5R
Benzo Copper Blue B, 2B
Benzo Sky Blue, conc., 4B
Benzo Red Blue G
Brilliant Azurine B, 5G, 2R, 5R
Brilliant Benzo Blue 6B
Brilliant Sky Blue G
Chicago Blue B, R
Diazo Blue Black
Diazo Black B, 3B, BHN, BHN extra, R, R extra

Violet: Azo Violet
Benzo Fast Violet R
Benzo Violet R, RL extra
Brilliant Benzo Violet B, 2R
Heliotrope BB

Brown: Benzo Brown brands
Benzo Chrome Brown B, CR, G, 5G
Diazo Brown G
Direct Bronze Brown
Direct Fast Brown B, GG
Pluto Brown GG, NB, R
Toluylene Brown B, M

Grey: Diazo Black BHN
Pluto Black CR, G, SS extra

Black: Benzo Fast Black
Diazo Black 2B
Direct Blue Black B, N
Direct Deep Black brands
Pluto Black A, A extra, 3B extra, BS extra, CF extra, F extra, F extra conc., FR, TG extra, TG extra conc.

206. Katigen Colours for dyeing Chardonnet silk.

Prepare the bath as usual for Katigen Colours, allow to cool down to 120° Faht., enter the goods, and dye in the cooling down bath. All the Katigen Colours are suitable except:

Katigen Black 2B, TG

207. Acid and Sulphon Colours for dyeing Chardonnet silk.

Dye for ¾—1 hour at a temperature of from 115—120° Faht. with an addition of 10—15 % Glauber's salt. (Alkali Blues must be afterwards acidulated.)

Red:	Bordeaux extra
	Fast Red A
	Eosine I bluish, S extra yellowish
Orange:	Croceine Orange R
	Orange GT
Yellow:	Indian Yellow R
	Sulphon Yellow 5G
Green:	Alizarine Cyanine Green G extra
Blue:	Alkali Blue brands
	Naphtaline Acid Black 4B
	Acid Black 5B
	Sulphon Cyanine G, 3R
	Sulphon Black 4BT, G, R
Violet:	Alkali Violet LR

Glanzstoff.

208. Basic Colours for dyeing Glanzstoff.

Mordant the Glanzstoff before dyeing with tannic acid and tartar emetic. Enter the material at 140° Faht. after adding to the bath 2—4% tannic acid and, preferably, ½—1% hydrochloric acid, work for a short time and then leave in the liquor for 2—3 hours, turning at intervals. Before lifting turn again several times, then lift, hydroextract and aftertreat for 20—30 minutes in a fresh bath containing 1—2% tartar emetic.

The dyeing is carried out with an addition of 3—6% acetic acid. Enter the material at the usual temperature; add the colour in several portions and finally warm up the liquor to about 120° Faht.

209. Benzo Colours for dyeing Glanzstoff.

Dye as stated for Chardonnet silk, heat up the liquor, however, to 140—150° Faht., for the Benzo Fast Scarlets up to 175° Faht. in order to exhaust the bath better. It is advisable to commence the dyeing of light fashion shades without Glauber's salt and only to add same after the dyeing has been going on for some time. An addition of soda furthers the level dyeing, while 2—4% Monopole Soap also aids the shades to turn out even and gives the material a soft handle. All Benzo Colours are suitable for dyeing this kind of material, except the following, which are not sufficiently absorbed:

Orange:	Chloramine Orange G
Blue:	Benzo Indigo Blue

	Benzo Navy Blue B
	Benzo Black Blue G
	Brilliant Azurine R
Black:	Benzo Chrome Black B, N
	Pluto Black CR, G

210. Katigen Colours for dyeing Glanzstoff.

Dye as stated for Chardonnet silk, but it is only necessary to cool down the bath to 150° Faht. Katigen Black 2B and TG are not suitable for the dyeing of Glanzstoff.

Linen and Half-Linen.

Linen has either to be scoured with 5—10% soda or bleached before dyeing. As linen does not resist acids and alkalies so well as cotton, diluted bleaching and acid liquors are employed and each treatment is repeated several times, whereby injury to the fibre is avoided.

The process of dyeing linen and half-linen scarcely differs from that employed for cotton, but a few precautionary measures are to be observed as the linen is not so easily penetrated. For example it will be found beneficial to add Turkey red oil or Monopole Soap to the bath and to reduce the quantity of salt.

All colours used for dyeing cotton are equally well adapted for linen and half-linen.

The dyeing of Ramie (China grass).

Dyeing with Benzo Colours.

Ramie is dyed in the same way as cotton. The goods are entered at the boil in a bath prepared with 10—40 % Glauber's salt cryst. or half as much common salt, according to the depth of shade required, and worked for 1 hour. The baths do not exhaust completely.

In dyeing this kind of material with Diazo Colours, the same dyeing and developing processes are followed as for cotton.

211. List of Benzo and Diazo Colours.

(See chapter 1, page 2, and chapter 2, page 6.)

Dyeing with Basic Colours.

When dyeing with Basic Colours it is necessary to mordant the goods first with tannic acid. Enter the goods in a hot bath containing 4—6 % tannic acid, allow to cool down, wring out or rinse but slightly, and then enter the goods into a cold bath containing 2 % tartar emetic. After $^1/_2$ hour wring out and dye.

The dyeing process is carried out by entering the goods into a cold bath and warming up slowly to 120—140 ° Faht. The bath exhausts in $^1/_2$ hour. It is advisable to add 1—2 % acetic acid to the bath in order to improve the level dyeing.

212. List of Basic Colours.

(See chapter 46, page 42.)

Dyeing with Katigen Colours.

Dye the Katigen Colours in the same way as stated for cotton.

213. List of Katigen Colours.

(See chapter 31, page 36.)

The dyeing of Jute.

Preparation.

Jute is usually dyed in the raw unbleached state; it is only necessary to previously bleach the yarn when bright and clear shades are desired.

The following is the simplest bleaching process: The jute is first of all boiled for 1 hour in a liquor containing 2% soda ash, afterwards rinsed with hot and then with cold water. After this, immerse the goods in a chloride of lime solution $1^1/_2$—2° Tw., for about 3—4 hours, turn frequently, then rinse and enter into a sodium bisulphite solution for about 1 hour, containing $^1/_4$ litre sodium bisulphite solution of 52° Tw. and 50 cc raw hydrochloric acid, per 10 litres water. Finally rinse and dry in the open.

Dyeing with Basic Colours.

The Basic Colours are usually dyed neutral. Only when employing hard water has same to be corrected with acetic acid. As the Basic Colours are easily absorbed, it is advisable either to enter the goods lukewarm and to gradually heat up the liquor to 175° Faht., or to add 1—2% alum, in order to facilitate the level dyeing. The last mentioned ingredient, however, is unnecessary if the water has been corrected with acetic acid.

214. List of Basic Colours.

Red:	Diamond Fuchsine
	Crimson Substitute
	New Magenta
	Rhodamine B, B extra, G, G extra
	Saffranine FF extra
Orange:	Chrysoidine G
	Rhoduline Orange N
Yellow:	Auramine O, II
	Coriphosphine O
	Rhoduline Yellow 6G
Green:	Brilliant Green cryst.

	China Green cryst.
	Imperial Green GI
Blue:	Navy Blue R 20311
	Methylene Blue BB
	New Blue D, R extra
	New Victoria Blue B
	Rhoduline Blue GG extra
	Rhoduline Sky Blue 2B
	Victoria Blue B
Violet:	Brilliant Rhoduline Violet R
	Crystal Violet P
	Methyl Violet brands
	Rhoduline Violet
	Rhoduline Heliotrope B, 3B
Brown:	Bismarck Brown F
	Brown 22264
	Dark Brown B
	Fashion Brown 20303, 20304
Black:	Jute Coal Black S
	Jute Black 21839, B
	Jute Deep Black 22730

Dyeing with Acid Colours.

Acid Colours have found great favour for the dyeing of jute on account of their good penetration and level dyeing property even in light shades.

Enter the jute into the boiling liquor containing 2—5% alum and dye for $^1/_2$ hour after turning off steam. Dry the jute after dyeing without first rinsing.

215. List of Acid Colours.

Red:	Bordeaux extra, G
	Brilliant Fast Red P
	Brilliant Croceine 3B
	Croceine Scarlet 5B, 7B, 8B
	Double Ponceau 4R
	Fast Red A, NS
	Jute Scarlet 3BH, 3G extra, 21511, 22575
	Imperial Scarlet 3B
	Scarlet R
Orange:	Croceine Orange G, R
	Orange IIB, RO
Yellow:	Indian Yellow G, GR, R
	Metanil Yellow extra

Green:	Brilliant Acid Green 6B
	New Acid Green 3BX, GX
	Acid Green GG extra, 3B
Blue:	Cotton Blue brands
	Soluble Blue 3B extra greenish
	Wool Blue N extra, R extra
	Wool Fast Blue BL, GL
Violet:	Fast Acid Violet 10B
	Acid Violet brands
Grey:	Nigrosine B, G
	Induline B

Dyeing with Benzo Colours.

The method of dyeing is the same as that in use for cid Colours, except that 20—40% Glauber's salt cryst. r half as much common salt is added to the bath in lace of alum. After dyeing the goods must be rinsed.

216. List of Benzo Colours.

Red:	Benzo Bordeaux 6B
	Benzo Purpurine 4B, 6B
	Benzo Red 10B
	Brilliant Congo R
	Brilliant Purpurine R
	Congo Red
	Congo Rubine
Orange:	Benzo Fast Orange S
	Benzo Orange R
	Pluto Orange G
Yellow:	Brilliant Yellow
	Chloramine Yellow GG, HW, M
	Chrysophenine G, R
	Direct Yellow R
Green:	Benzo Dark Green B, GG
	Benzo Green BB, C, G
	Benzo Olive
	Green E 22628
	Olive E 22629
Blue:	Benzo Blue BX, 2R, 4R, RW
	Benzo Fast Blue B, R
	Benzo Navy Blue B
	Benzo Sky Blue 4B
	Benzo Red Blue G
	Brilliant Benzo Blue 6B
	Chicago Blue B, G

	Congo Blue 2B
	Diazo Black BHN
Violet:	Azo Violet
	Benzo Fast Violet R
	Benzo Violet R, RL extra
	Brilliant Benzo Violet B, 2R
	Chloramine Violet R
	Congo Corinth B, G
Brown:	Benzo Brown D3G extra, GG, NB, NBX, RC
	Benzo Chrome Brown B, G, R
	Direct Fast Brown B, GG
	Pluto Brown GG, NB, R
Grey and Black:	Direct Deep Black E extra, EW extra, RW extra
	Pluto Black A extra, 3B extra, F extra

Dyeing with Katigen Colours.

The Katigen Colours are dyed at a temperature of 175° Faht., with an addition of an equal amount (for single strength qualities) or double the amount (for extra brands) of sulphide of soda cryst. as colour taken, 10—30% common salt, and 2—5% soda.

217. List of Katigen Colours.

(See chapter 31, page 36.)

The dyeing of Coir yarn and Coir fibre.

Coir yarn is chiefly dyed in the unbleached state. The bleaching may be carried out in the same way as prescribed for jute (see page 161).

Dyeing with Basic Colours.

Dye the goods neutral or (in order to obtain better penetration and levelling) with an addition of alum. Enter the Coir yarn into the hot liquor, turn off steam and dye for $^1/_2$ hour. Hard water must be corrected with acetic acid.

218. List of Basic Colours.

Red:	Diamond Fuchsine
	Crimson substitute
	New Magenta
	Rhodamine B, B extra, G, G extra
	Saffranine FF extra
Orange:	Chrysoidine G
	Rhoduline Orange N
Yellow:	Auramine O, II
	Coriphosphine O
Green:	Brilliant Green cryst.
	China Green cryst.
	Imperial Green GI
Blue:	Navy Blue R 20311
	Methylene Blue BB
	New Victoria Blue B
	Victoria Blue B
Violet:	Crystal Violet P
	Methyl Violet brands
Brown:	Bismarck Brown F
	Dark Brown B
	Fashion Brown 20303, 20304

Black:	Jute Coal Black S
	Jute Black 21839
	Jute Deep Black 22730

Dyeing with Acid Colours.

Enter the Coir yarn near the boil and dye with an addition of 2—5% alum or sulphate of alumina. After about ½ hour lift out the yarn and, without rinsing, hang up to dry.

219. List of Acid Colours.

Red:	Bordeaux extra, G
	Brilliant Croceine 3B
	Brilliant Fast Red P
	Brilliant Red 23407
	Carmoisine B
	Double Ponceau 4R, RO, 22187
	Fast Red A, NS
	Jute Scarlet 3BH, 3G extra, 21511, 22575
	Scarlet R
	Imperial Scarlet 3B
Orange:	Orange IIB
Yellow:	Indian Yellow G, GR, R
	Metanil Yellow, extra
Green:	Brilliant Acid Green 6B
	Acid Green 3B, GG extra
Blue:	Cotton Blue brands
	Soluble Blue 3B extra greenish
	Wool Blue N extra, R extra
Violet:	Acid Violet brands
Brown:	Fast Brown
Grey:	Induline B
	Nigrosine, B

Dyeing with Benzo Colours.

Dye for 1 hour, preferably in a boiling liquor, with an addition of 10—20% Glauber's salt or common salt; for black shades also add 2% soda.

220. List of Benzo Colours.

Red:	Benzo Purpurine 4B, 6B, 10B
	Brilliant Congo R
	Brilliant Purpurine R
	Congo Red
	Congo Rubine

Orange:	Benzo Fast Orange S
	Benzo Orange R
	Pluto Orange G
Yellow:	Chloramine Yellow GG, HW, M
	Chrysamine G, R
	Chrysophenine G, R
	Direct Yellow R
Green:	Benzo Dark Green B, GG
	Benzo Green C
	Benzo Olive
Violet:	Congo Corinth B, G
Brown:	Benzo Brown D3G extra, R extra, RC
	Benzo Chrome Brown B, G, R
	Pluto Brown NB
Grey and Black:	Direct Deep Black E extra, EW extra, RW extra

The dyeing of calf, sheep and kid leather tanned with vegetable agents.

Preparation.

In order to obtain uniform shades on leather tanned with vegetable agents, the leather must be carefully freed from superfluous and unfixed tanning matter, as well as from all other impurities arising from the tanning or storing. The excess of tanning matter, or its uneven distribution on the leather, very easily causes spots, especially when dyeing with Basic Colours.

The skins are therefore laid in running water for a long time or treated in the milling drum through which a constant stream of water passes until it runs off clear. The skins are then milled again in lukewarm water until they become perfectly soft and have the characteristic slippery handle which indicates that they are in a proper condition for dyeing.

Dyeing with Basic Colours.

It is necessary to use soft water when dyeing with this class of colours. Should only hard water be available, an addition of 1—5 cc acetic acid per litre water, according to the hardness of the water, must be made.

The colour solution is either brushed on at 75—120° Faht. or is fixed by working in the trough. For the latter method the skins are paired off with the flesh sides together, so that the grain is on the outside, and then worked by hand for 6—8 minutes at 130° Faht. in the liquor. Often two baths are employed for the purpose of improving the level dyeing. After the skins are dyed, rinse in lukewarm water, stretch out, and then oil with linseed or train oil on the grain side, dry, and, if necessary, moisten with dilute milk, albumen or gelatine, and dry again.

Some Basic Colours produce a metallic lustre, especially when dyed in dark shades, but this can be removed by running the skins through dilute acetic or lactic acid.

For saddening the shades, acetate of iron and sometimes bichrome or titanium salts are employed.

Skins with a hard grain, on which the colours do not fix well at once, should be previously milled lukewarm with an addition of borax.

221. List of Basic Colours.

Red:	Brilliant Rhoduline Red B
	New Magenta
	Rhodamine B, B extra, G, G extra
	Rhoduline Pink 5G (Rhodamine 5G)
	Rhoduline Scarlet G (Rhodamine Scarlet G)
	Rhoduline Red B, G
	Saffranine FF extra
Orange:	Rhoduline Orange N, NO
Yellow:	Auramine II, O
	Canella
	Coriphosphine O, OX, OX extra
	Leather Yellow GG, GO, O extra
	Phosphine extra
	Rhoduline Yellow 6G
Green:	Brilliant Green cryst.
	China Green cryst.
Blue:	Leather Blue B
	Methylene Blue BB
	New Blue D, R extra
	Rhoduline Blue GG extra, R
	Rhoduline Sky Blue BB
	Turquoise Blue BB, G, GL extra
Violet:	Crystal Violet P
	Leather Corinth 20650
	Methyl Violet 1B—7B, 1R—5R
	Rhoduline Heliotrope B, 3B
	Rhoduline Violet
Brown:	Bismarck Brown F, M, R extra
	Dark Brown B, R
	Havanna Brown G, GG, 4G, M, O, R, T
	Leather Brown F, GG
	Fashion Brown GO, RO
	Tobacco Brown new
Black:	Leather Black C, M extra, T, 22063
	Leather Blue Black 23037
	Leather Deep Black 22124

Dyeing with Acid Colours.

Dye the leather in the trough as stated for Basic Colours at 130° Faht. with the well dissolved Acid Colour, with an addition of 5 cc sulphuric acid 168° Tw. per 6 litres water. Special care must be taken to rinse the goods thoroughly. It is also advisable to add acetate of soda to the rinsing bath, in order to prevent any detrimental effects of the sulphuric acid showing up later. The dressing is the same as mentioned under Basic Colours.

222. List of Acid Colours.

Red:	Azo Fuchsine B, G, S
	Azo Crimson L, S
	Azo Phloxine 2G
	Bordeaux G, extra for leather
Red:	Brilliant Croceine 3B
	Brilliant Double Scarlet 3R
	Brilliant Ponceau 4R, 5R
	Carmoisine B, 3B
	Cochineal Scarlet PS
	Croceine Scarlet brands
	Double Ponceau R, 3R, 4R
	Fast Red A, BT, NS
	Ponceau 1R, 3R, 2RL
	Acid Anthracene Red 3B, G
	Acid Magenta
	Imperial Scarlet 1B
	Scarlet 3B, 22802, R
Orange:	Mandarine G
	Orange IIB
	Sulphon Orange G
Yellow:	Quinoline Yellow
	Chrome Yellow R extra
	Fast Light Yellow G, 2G, 3G
	Indian Yellow G, GR, R
	Tartrazine
Green:	Alizarine Cyanine Green E, G extra, 3G
	Brilliant Acid Green 6B
	Fast Green, extra, bluish, CR
	Fast Light Green
	Acid Green BB extra, BBN extra, GG extra, L
	Wool Green BS
Blue:	Cotton Blue I, II, IV, VI, R
	Fast Acid Blue B, B extra
	Induline B, 6B new

	Night Blue extra greenish
	Navy Blue, RP
	New Patent Blue B, 4B, GA
	Red Blue extra conc.
	Wool Fast Blue BL, GL, RL
	Wool Blue N extra, R extra
Violet:	Fast Acid Violet 10B
	Acid Violet B extra, 7B, HW, R extra, 3R
Brown:	Fast Brown
	Acid Anthracene Brown G, R, T, W
Black:	Naphtole Black 2B
	Naphtylamine Black 4B, 10B, 4BK, S
	Phenylamine Black 4B, T
	Acid Black 4BL, LD
	Victoria Black B
Grey:	Alizarine Blue Black B, 3B
	Induline B
	Nigrosine B, G, R, 12831

223. Basic Colours, solutions of which are adapted for the staining of bark tanned cow-leather.

Red:	New Magenta
	Saffranine FF extra
Yellow:	Auramine O
	Leather Yellow B, C, GG, GO, RO
	Phosphine extra
	Rhoduline Yellow 6G
Green:	China Green cryst.
Blue:	Leather Blue B
	Methylene Blue BB
	New Blue D, R extra
	New Victoria Blue B
	Rhoduline Blue G, G extra, R
	Rhoduline Sky Blue BB
	Turquoise Blue BB, G
	Victoria Blue B
Violet:	Methyl Violet 1B—7B
	Crystal Violet P
Brown:	Bismarck Brown F, M, R extra
	Leather Brown F, GG
	Fashion Brown GO, RO
Black:	Leather Blue Black 23037
	Leather Black C 21348, T, M extra
	Leather Deep Black 22124

Chrome leather.

Dyeing with Basic Colours.

Chrome tanned leather is first treated with borax or ammonia in order to remove all acid, well rinsed, then treated in a tanning bath for $^1/_2$ hour (Gambier, Sumac or Gallic extract) and washed well. The skins are dyed at about 120° Faht. in the milling drum with Basic Colours or sometimes by immersing in the tray in pairs, with the flesh sides together.

After dyeing treat the leather in the milling drum for about $^1/_2$ hour with an emulsion consisting of olive oil soap and neat's foot oil or the yolk of egg, stretch out and dry, then crutch and season with an albumen solution.

224. List of Basic Colours.

Red:	New Magenta
	Saffranine F F extra
Orange:	Rhoduline Orange N
Yellow:	Auramine O
	Coriphosphine O
Green:	China Green cryst.
	Methylene Green B
Blue:	Leather Blue B
	Rhoduline Blue GG extra
Violet:	Crystal Violet P
	Methyl Violet brands
	Rhoduline Violet
Brown:	Bismarck Brown F, M, R extra
Black:	Leather Blue Black B 23037

Dyeing with Acid Colours.

It is advisable to previously dye the skins with Acid Colours, with an addition of Gallic extract and a little acetic acid, especially when full shades are required. The shades thus bottomed are then topped with Basic Colours. Excepting blacks, for the production of which Substantive Colours should be employed, the Acid Colours mentioned for the dyeing of leather tanned with vegetable agents, are also adapted for the dyeing of chrome leather.

Dyeing with Benzo Colours.

Only black shades come into consideration here, as fancy Benzo Colours do not turn out level, Dye at about 160—175° Faht. for $^1/_2$ hour. It is absolutely necessary to free the material from all traces of acid. After dyeing oil and season in the ordinary manner.

225. List of Benzo Colours.

Black: Direct Deep Black E extra, EW extra, RW extra
Chrome Leather Black F conc. 22771 (for chromed kid and sheep leather)
Chrome Leather Black F 23964, 24320 (for box calf)
Pluto Black F extra, TG extra conc.

Dyeing with Alizarine and Mordant Colours.

Dye at 140° Faht. in the milling drum with an addition of acetic acid. In this way shades very fast to light are obtained. For the production of deep shades, it is necessary to top-dye with Basic Colours.

226. List of Alizarine and Mordant Colours.

Red: Alizarine Red PS, SB, W, W extra
Cloth Red B, 3B extra, G
Orange: Alizarine Orange R
Yellow: Alizarine Yellow 3G, R
Chrome Yellow D, G, R extra
Diamond Flavine G
Green: Alizarine Cyanine Green E, G extra, K
Alizarine Viridine FF
Blue: Alizarine Astrole B, G
Alizarine Blue S, SR
Alizarine Cyanine G extra, R
Alizarine Irisole R
Alizarine Sky Blue B
Alizarine Sapphirole SE
Brilliant Alizarine Blue G, R
Violet: Alizarine Cyclamine R paste
Brown: Anthracene Brown G, R, W
Black: Alizarine Cyanine Black G
Alizarine Fast Grey

The dyeing of paper in the pulp (in the beater).

(The pulp usually consists of 60% mechanical wood and 40% chemical wood.)

For bright and delicate blues, reds and greens, it is best to employ bleached cellulose, for browns or blacks unbleached cellulose. Dye whenever possible, with colours that are easily soluble.

Dyeing with Basic Colours.

Add to the paper pulp in the beater 4% sulphate of alumina dissolved in water, allow to run for several minutes, then add the well dissolved Basic Colour, allow to run for 10 minutes, then add 4% resin soap.

When dyeing with combinations, add the different colours to the paper pulp one after the other.

The waste water is generally clear in about 1/4 hour.

Note: When dyeing a combination of Paper Black T and Coal Black B, add the Paper Black T to the pulp first, then the sulphate of alumina, afterwards the Coal Black B, and finally the resin soap.

227. List of Basic Colours.

Red:	Brilliant Rhoduline Red B
	Diamond Fuchsine cryst.
	New Magenta
	Rhodamine B, B extra, G, G extra
	Rhoduline Pink 5G (Rhodamine 5G)
	Rhoduline Scarlet G (Rhodamine Scarlet G)
	Rhoduline Red G
	Saffranine FF extra, superfine yellowish
Orange:	Chrysoidine G
	Rhoduline Orange N, NO

	Rhoduline Yellow 6G
Yellow:	Auramine II, O
	Coriphosphine O
Green:	Brilliant Green cryst.
	China Green cryst.
	Imperial Green GI
Blue:	Methylene Blue BB
	New Victoria Blue B
	Paper Blue B
	Rhoduline Blue GG extra, R
	Rhoduline Sky Blue BB
	Turquoise Blue BB, G
	Victoria Blue B
Violet:	Crystal Violet P
	Methyl Violet brands
	Rhoduline Violet
Brown:	Bismarck Brown F, M, R extra
Grey:	Paper Grey 21307
Black:	Coal Black B
	Jute Coal Black S

Dyeing with Acid Colours.

Acid Colours are dyed in a similar manner to Basic Colours by adding 4% sulphate of alumina dissolved in water to the paper pulp, then the dissolved Acid Colour, and afterwards the resin soap.

Note: Paper pulp dyed with Acid Colours is appropriately topped with Basic Colours. This method of dyeing is to be recommended as the pulp is dyed more evenly, and the mottled appearance (which easily occurs when using Basic Colours alone) is almost entirely avoided.

228. List of Acid Colours.

Red:	Azo Cochineal
	Azo Eosine
	Bordeaux extra, G
	Brilliant Croceine 3B, conc.
	Brilliant Fast Red P
	Carmoisine B
	Cochineal Scarlet PS
	Croceine Scarlet brands
	Eosine brands
	Metanil Red 3B, 3B extra
	Imperial Scarlet 3B
	Scarlet R

Orange:	Croceine Orange G, R
	Mandarine G
	Orange IIB, RO
Yellow:	Quinoline Yellow
	Metanil Yellow extra
Green:	Brilliant Acid Green 6B
	Acid Green 3B, GG extra
Blue:	Alkali Blue brands
	Cotton Blue brands
	Navy Blue RP,
	Red Blue extra conc.
	Soluble Blue 3B extra greenish, greenish extra conc., TB
	Wool Fast Blue BL, GL
Violet:	Acid Violet 4B extra
Black:	Nigrosine B, G, R
	Phenol Black SS

Dyeing with Benzo Colours.

Dye as stated for Acid Colours, exept that the colour solution is first added to the bath and the sulphate of alumina subsequently.

229. List of Benzo Colours.

Red:	Benzo Fast Red FC, L
	Geranine G
Orange:	Benzo Orange R
	Pluto Orange G
Yellow:	Benzo Fast Yellow 5GL
	Brilliant Yellow
	Chrysophenine G, R
	Paper Yellow GG extra, R extra
Green:	Benzo Dark Green B, GG
Blue:	Benzo Azurine G
	Brilliant Benzo Blue 6B
	Benzo Sky Blue
Violet:	Benzo Violet R
Brown:	Benzo Brown BX, D3G extra
	Benzo Chrome Brown B, G
Black:	Paper Black T (see note above)

Dyeing with Katigen Colours.

The ordinary Katigen brands are dissolved in water with an equal amount of sulphide of soda cryst. as colour,

the extra brands with double the amount. Add the solution to the paper in the beater and inject air into the pulp until the detrimental action of the sulphide of soda is removed by oxydation. The paper can then be sized as before with sulphate of alumina and resin soap.

Note: Besides cellulose (chemical wood-pulp), cotton, jute and linen rags etc. are used for mixing purposes. These are dyed separately with Substantive or Sulphide Colours and then added to the pulp.

230. List of Katigen Colours.

Yellow:	Katigen Yellow G, GG extra
Green:	Katigen Green 2B, 2G
Blue:	Katigen Indigo B extra, CL extra, RL extra
Brown:	Katigen Brown V extra
	Katigen Cutch B
	Katigen Yellow Brown GG extra, R extra
	Katigen Red Brown 3R
	Katigen Black Brown B extra conc., N extra conc.
Grey:	Katigen Black SWR extra, TG extra conc.
Black:	Katigen Black brands

Dyeing of blotting paper.

The paper pulp is dyed in the beater for about $^1/_4$ hour with the well dissolved Benzo Colours, but not sized.

231. List of Benzo Colours.

Red:	Benzo Fast Scarlet 4BS, 8BS
	Benzo Purpurine 4B, 10B
	Brilliant Geranine B
	Congo Rubine
	Geranine G
Orange:	Benzo Orange R
	Chloramine Orange G
	Congo Orange G
	Pluto Orange G
Yellow:	Chrysophenine G, R
	Paper Yellow GG extra, R extra
	Thiazole Yellow G, 3G, GL
Green:	Benzo Dark Green B, GG
	Benzo Green BB, C, G
	Benzo Olive

Blue:	Benzo Azurine G, R
	Benzo Blue 3B, BX, 2R, RW
	Benzo Sky Blue, conc., 4B
	Brilliant Azurine B, 5G, 5R
	Brilliant Benzo Blue 6B
Violet:	Benzo Violet R
	Brilliant Benzo Violet B, 2R
	Congo Corinth B, G
	Heliotrope BB
Brown:	Benzo Brown BX, MC, NBR, RC
	Benzo Chrome Brown B, G, R, 3R
	Pluto Brown NB
Grey:	Benzo Fast Black
Black:	Direct Blue Black B
	Direct Deep Black E extra
	Pluto Black TG extra conc.

Colours which are adapted for staining paper.

Basic or Acid Colours used for staining purposes are thoroughly dissolved in water. The solution is then filtered, and brushed well on the paper with a soft brush.

232. List of Basic Colours.

Red:	Brilliant Rhoduline Red B
	Diamond Fuchsine cryst.
	Rhodamine B, B extra, G, G extra
	Saffranine FF extra, superfine yellowish
Orange:	Chrysoidine cryst.
Yellow:	Auramine O
Green:	Brilliant Green cryst.
	China Green cryst.
Blue:	Methylene Blue BB
	Turquoise Blue BB, G
Violet:	Methyl Violet brands
	Rhoduline Violet

233. List of Acid Colours.

Red:	Croceine Scarlet brands
	Eosine I bluish, I yellowish, S extra bluish, S extra yellowish

Orange:	Croceine Orange G
	Orange IIB, RO
Yellow:	Quinoline Yellow
	Fast Light Yellow G, 2G, 3G
	Metanil Yellow
	Tartrazine
Green:	Brilliant Acid Green 6B
	Parrot Green
	Acid Green BB extra, GG extra
Blue:	New Patent Blue B, 4B, GA
Violet:	Acid Violet brands
Grey:	Induline B
	Nigrosine B

The dyeing of white tissue paper in the machine.

Tissue paper is dyed in the machine by running the eady made paper through the concentrated colour solution nd then drying on a hot cylinder.

234. List of Basic Colours.

Red:	New Magenta
	Rhodamine B, B extra, G, G extra
	Saffranine FF extra, superfine yellowish
Yellow:	Auramine O
	Coriphosphine O
Green:	Brilliant Green cryst.
	China Green cryst.
Blue:	Methylene Blue BB
	Turquoise Blue BB, G
	Victoria Blue B
Violet:	Crystal Violet P
	Methyl Violet brands
Brown:	Bismarck Brown F conc., M, R extra

235. List of Acid Colours.

Red:	Brilliant Croceine 3B, 3B conc.
	Eosine S extra bluish, S extra yellowish
Orange:	Croceine Orange G
	Orange IIB
Yellow:	Metanil Yellow extra
	Naphtol Yellow S

	Tartrazine
Green:	Brilliant Acid Green 6B
	Acid Green brands
Blue:	New Patent Blue B, 4B, GA
Violet:	Acid Violet brands

236. List of Benzo Colours.

Red:	Benzo Purpurine 4B, 10B
Orange:	Congo Orange G
Yellow:	Chrysophenine G. R
	Paper Yellow GG extra, R extra
Blue:	Brilliant Benzo Blue 6B
	Benzo Sky Blue, conc.
Violet:	Benzo Violet R
	Brilliant Benzo Violet B, 2R
	Heliotrope BB

The dyeing of ingrain paper by staining.

237. List of Acid Colours.

Red:	Azo Crimson S
	Brilliant Croceine 3B
Orange:	Croceine Orange G
	Orange IIB
Yellow:	Fast Light Yellow G, 2G, 3G
Green:	Alizarine Cyanine Green E, G extra, 3G
Blue:	Alizarine Sapphirole SE
Grey:	Alizarine Blue Black 3B

The Dyeing of Feathers.

Preparation.

Clean the feathers in warm water containing small quantities of olive oil soap and ammonia, until the grease has been entirely removed.

Note: The feathers may be bleached with hydrogen peroxide.

Dyeing.

Feathers are generally dyed with Acid Colours. Basic Colours are not so often employed as they do not dye the quills sufficiently.

After cleaning the feathers well, dye for 1 hour at the boil with an addition of 2—5% sulphuric acid 168° Tw., then rinse well, dry, and steam.

238. List of Acid Colours.

Red:	Bordeaux extra, G
	Brilliant Croceine 3B
	Carmoisine B
	Croceine Scarlet brands
	Fast Red A, NS
	Rhodamine*) B, B extra, G, G extra
	Rhoduline Pink 5G (Rhodamine 5G)
	Acid Magenta
Orange:	Croceine Orange
	Mandarine G
	Orange IIB
Yellow:	Quinoline Yellow
	Indian Yellow G, GR, R
	Tartrazine
Green:	Brilliant Acid Green 6B
	Acid Green GG extra

*) These should be dyed with acetic instead of sulphuric acid.

Blue:	Alizarine Sapphirole B, SE
	Brilliant Wool Blue B extra
	New Patent Blue B, 4B, GA
	Wool Blue N extra, R extra
Violet:	Acid Violet 4B extra, 6BN, R extra, 3R
Brown:	Azo Acid Brown
	Fast Brown
Grey:	Alizarine Blue Black 3B
Black:	Feather Black T24005, TB extra
	Naphtylamine Black 10B

The Dyeing of Straw.

Preparation.

The straw is first boiled in water for about 1—2 hours (for hard straw it is advisable to add $^1/_2$—1% soda ash) in order to rid it of dirt, etc. The straw must be bleached for light and delicate shades, but for dark shades this is not necessary.

The following has proved to be the best method of bleaching: Dissolve 32 grms oxalic acid in 1 litre water, and, whilst constantly stirring, slowly add 20 grms peroxide of soda. As the liquor is still acid (blue litmus paper is dyed red), add sufficient silicate of soda solution to make it just alkaline (red litmus paper should turn slightly blue). Immerse the straw into this bath for 1—2 days, then rinse in water, acidulate with dilute sulphuric acid (about 2 grms sulphuric acid 168° Tw. per litre water), carefully rinse again, and dry in the open.

Dyeing with Basic Colours.

The Basic Colours are the best adapted for dyeing straw, as only with this class of colours is it possible to get deep shades.

Boil the prepared straw for about 2—3 hours in the dye liquor with an addition of 2—3% acetic acid. After dyeing, rinse and dry in the open.

239. List of Basic Colours.

Red: Brilliant Rhoduline Red B
Crimson substitute
Leather Red R
New Magenta
Rhodamine B, B extra, G, G extra
Rhoduline Pink 5G (Rhodamine 5G)
Saffranine FF extra

Orange:	Chrysoidine G
	Rhoduline Orange N
Yellow:	Auramine II, O
	Coriphosphine O
Green:	Brilliant Green cryst.
	China Green cryst.
	Leather Green B
	Methylene Green B
	Olive 20305
Blue:	Navy Blue F, R 20311, DR for straw, extra for straw
	Methylene Blue BB
	New Blue D, R extra
	New Victoria Blue B
Violet:	Methyl Violet brands
	Rhoduline Heliotrope B, 3B
	Rhoduline Violet
Brown:	Bismarck Brown F, M
	Fashion Brown 20303, 20304
Grey:	New Blue R extra
Black:	Leather Black T
	Jute Black B
	Jute Coal Black S
	Straw Black 22395

Dyeing with Acid Colours.

Dye in the same way as with Basic Colours.

240. List of Acid Colours.

Red:	Brilliant Croceine 3B
	Eosine I bluish, I yellowish
Orange:	Orange II B
Yellow:	Quinoline Yellow
	Indian Yellow G, GR, R
Green:	Brilliant Acid Green 6B
	Acid Green G G extra
Blue:	Wool Blue N extra, R extra
Violet	Acid Violet 4B extra, R extra
Grey:	Alizarine Irisole R
	Alizarine Blue Black 3B
	Induline B
	Nigrosine B

Dyeing with Benzo Colours.

Dye for 4—6 hours at the boil with an addition of 2% borax and 20% Glauber's salt cryst.

241. List of Benzo Colours.

Red:	Benzo Purpurine
	Brilliant Geranine
	Congo Rubine
Orange:	Benzo Fast Orange S
Yellow:	Chrysophenine G
Green:	Benzo Dark Green B, GG
Blue:	Benzo Azurine G
Violet:	Benzo Violet R
Brown:	Benzo Brown D3G extra
	Pluto Brown NB
Grey:	Benzo Fast Black
Black:	Direct Deep Black E extra
	Pluto Black A extra

The Dyeing of Chip Plait.

Dyeing with Basic Colours.

Dye at the boil for 1 hour with an addition of acetic acid, rinse well and dry at a low temperature.

242. List of Basic Colours.

Red:	Brilliant Rhoduline Red B
	New Magenta
	Rhodamine B, B extra, G, G extra
	Saffranine FF extra
Orange:	Chrysoidine G, G conc.
Yellow:	Auramine II, O
	Coriphosphine O
Green:	Methylene Green B
Blue:	Navy Blue 115, 20311
	Methylene Blue BB
Violet:	Rhoduline Heliotrope
	Rhoduline Violet

Dyeing with Acid Colours.

Dye with an addition of 1—2% sulphuric acid and work as stated for Basic Colours. A very thorough rinsing s absolutely necessary

243. List of Acid Colours.

Red:	Brilliant Croceine 3B
	Jute Scarlet 3G extra
Orange:	Croceine Orange G, R
	Orange IIB
Yellow:	Indian Yellow G, GR, R
	Metanil Yellow conc.
Green:	Brilliant Acid Green 6B
	Acid Green 3B, GG extra

Blue:	Alizarine Sapphirole SE
	Cotton Blue brands
	Wool Blue N extra, R extra
Violet:	Acid Violet 4B extra, 6BN, HW, R extra, 3R
Brown:	Azo Acid Brown
	Fast Brown
Grey:	Alizarine Blue Black 3B
	Alizarine Irisole R
	Induline B
	Nigrosine B

Dyeing with Benzo Colours.

Dye with an addition of 10—20% Glauber's salt or common salt and, if necessary, 1—2% soda; work as stated for Basic Colours.

244. List of Benzo Colours.

Red:	Benzo Bordeaux 6B
	Benzo Purpurine 4B
	Benzo Rhoduline Red B
	Congo Rubine
Orange:	Benzo Fast Orange S
	Congo Orange G, R
	Pluto Orange G
Yellow:	Chloramine Yellow GG, M
	Chrysamine G, R
	Chrysophenine G
Green:	Benzo Dark Green B, GG
	Benzo Green C
	Benzo Olive
Blue:	Benzo Sky Blue
	Brilliant Benzo Blue 6B
Violet:	Benzo Fast Violet R
	Benzo Violet RL extra
Brown:	Benzo Brown D3G extra, G, MC, RC
Black:	Direct Blue Black B
	Direct Deep Black E extra, EW extra, RW extra

The Dyeing and Staining of Wood.

245. List of Basic Colours.

Brilliant Rhoduline Red B
Rhoduline Red G

Saffranine FF extra
New Magenta
Rhodamine B, G
Rhoduline Pink 5G (Rhodamine 5G)
Brilliant Green
Methylene Blue BB
Victoria Blue B
Methyl Violet brands
Bismarck Brown F, M

246. List of Acid Colours.

Brilliant Croceine 3B
Eosine brands
Tartrazine
Orange IIB
Acid Green GG extra

247. List of colours suitable for dyeing (penetrating) wood (e. g. veneering wood) on account of their good penetrating qualities.

Fast Red NS
Tartrazine
Naphtole Green B
Acid Green GG extra
Induline B conc.
Fast Brown
Nigrosine B conc.

248. List of Basic Colours adapted for staining wood.

New Magenta
Saffranine FF extra
Chrysoidine G
Auramine O
Brilliant Green crys.
China Green cryst.
Victoria Blue B
Methylene Blue BB
Methyl Violet
Bismarck Brown

249. List of Acid Colours adapted for staining wood.

Brilliant Croceine 3B
Fast Red NS

Orange IIB
Quinoline Yellow
Tartrazine
Metanil Yellow
Brilliant Acid Green 6B
Acid Green GG extra
Naphtole Green B
Wool Blue N extra, R extra
Fast Acid Violet 10B
Acid Violet 4B extra, R extra
Fast Brown
Nigrosine B, AMD
Induline B

The dyeing of Gelatine.

Dyeing with Basic and Acid Colours.

Dissolve the colour in the necessary amount of water, filter the solution and add same to the gelatine.

250. List of Basic Colours.

Red:	Brilliant Rhoduline Red B
	Diamond Fuchsine cryst.
	New Magenta
	Rhodamine B extra, G extra
	Rhoduline Pink 5 G (Rhodamine 5G)
	Rhoduline Scarlet G
	Rhoduline Red G
	Saffranine FF extra, superfine yellowish
Orange:	Chrysoidine G conc. 22605
	Rhoduline Orange NO
Yellow:	Auramine O
	Coriphosphine OX extra
Green:	Brilliant Green cryst.
	China Green cryst.
	Methylene Green B
Blue:	Methylene Blue BB
	Rhoduline Sky Blue BB
	Victoria Blue B
Violet:	Brilliant Rhoduline Purple R
	Crystal Violet P
	Methyl Violet brands
	Rhoduline Violet
Brown:	Bismarck Brown F conc.

251. List of Acid Colours.

Red:	Brilliant Croceine 3B conc. 20722
	Bordeaux extra, G
	Fast Red NS

	Fast Acid Magenta B
	Acid Magenta
Orange:	Croceine Orange G, R
	Mandarine G
	Orange IIB, RO
Yellow:	Quinoline Yellow extra
	Metanil Yellow conc.
	Indian Yellow GR
	Tartrazine
Green:	Brilliant Acid Green 6B
	Naphtol Green B
	Acid Green L conc.
Blue:	Blue 4830
	Induline B conc. 12015
	New Patent Blue B, 4B, GA
	Wool Blue N extra, R extra
Violet:	Acid Violet 4B extra, 8B extra, R extra
Brown:	Fast Brown
Black:	Nigrosine AMD, B conc., LT, 12881

The dyeing of Soap.

252. Colours suitable for dyeing soap.

Red:	Azo Fuchsine B
	Brilliant Double Scarlet 3R
	Cochineal Scarlet PS
	Fast Acid Magenta B
	Eosine S extra yellowish, S extra bluish
	Helio Fast Red RL paste
	Rhodamine B, G
	Rhoduline Red G
	Saffranine FF extra
	Acid Anthracene Red G
	Cloth Red B
Orange:	Croceine Orange G, R
	Mandarine G
	Orange IIB
Yellow:	Coriphosphine O X
	Indian Yellow G, GR, R
	Metanil Yellow conc.
Green:	Alizarine Cyanine Green G extra
	Alkali Fast Green B, G
	Naphtol Green B
	Wool Green BS
Blue:	Alizarine Sky Blue B
	Methylene Blue BB
	Sulphon Cyanine G, 3R
Violet:	Alizarine Irisole R
Brown:	Diamond Brown R
	Fast Brown
	Acid Anthracene Brown R

Ceres Colours

(Colours soluble in fat).

The following colours are suitable for dyeing fat and oil, such as wax, cerine, paraffine, vaseline, tallow, stearic acid, olive oil, terpentine oil, mineral oil etc. As a rule the colours dye acid fats a brighter shade than the neutral ones. The Rhodamines are suitable for acid fats only, and especially for stearic acid or mixtures of fats which contain much stearic acid.

Most colours soluble in fat are also soluble in alcohol, ether, chloroform, benzene, acetone, amyl acetate, benzine, and other solvents. In water, however, the colours are insoluble, with the exception of the Rhodamines.

The following colours are insoluble (or almost insoluble) in terpentine oil: Ceres Yellow 2, Ceres Blue 5, Brilliant Scarlet 3G soluble in fat, the Nigrosines and Indulines.

The following colours are especially suitable for dyeing linseed oil: Ceres Yellow 1, 2, 4, Ceres Orange 3, Ceres Red 2, 3, and both the Brilliant Scarlet brands. The other colours though soluble in linseed oil, impair its drying capacity.

Brilliant Scarlet 3G soluble in fat and Ceres Blue 5 are only slightly soluble in ether.

Ceres Yellow 1 and 2 and both the Brilliant Scarlet brands are insoluble in Benzine; Ceres Red 2, 3 and Ceres Blue 5 are only slightly soluble.

253. List of Ceres Colours.

Quinoline Yellow soluble in spirit
Ceres Yellow 1, 2, 3, 4
Ceres Orange 1, 3
Ceres Red 2, 3
Brilliant Scarlet soluble in fat, 3G soluble in fat
Ceres Red 6
Rhodamine B extra, G extra

Ceres Violet
Ceres Blue 4, 5
Ceres Green 1, 2
Ceres Green 3 Base
Chrysoidine Base
Bismarck Brown R soluble in fat
Ceres Brown 1, 2, 3, 4
Induline Base 12390
Nigrosine Base SB, 12230, 12231, 12898
Nigrosine Base 12927, 12929
Nigrosine soluble in fat 12784, 12811

Spirit Lacquers.

For dyeing the above, all colours soluble in spirit (firstly, Basic Colours, secondly, Ceres Colours) are suitable.

Colours for Ink.

For the preparation of ordinary writing ink, solutions of colours which readily dissolve in water, are generally used with an addition of an agglutinant (e. g. gum arabic). Copying ink is produced with an addition of hygroscopic substances, sugar, dextrine, sirup, glucose and a little glycerine. As a preservative add carbolic acid, salicylic acid etc. For gallnut ink only acid colours are suitable.

254. Colours which are suitable for the manufacture of ink.

Red:	Brilliant Croceine 3B
	Croceine Scarlet 3BX
	Diamond Fuchsine
	Eosine I yellowish, I bluish, S extra yellowish, S extra bluish
	New Magenta
	Rhodamine B extra, G extra
Orange:	Chrysoidine G conc.
	Croceine Orange G, R
	Mandarine G
	Orange IIB
Yellow:	Auramine O
	Tartrazine
Green:	Brilliant Green cryst.
	Brilliant Acid Green 6B
	China Green cryst.
	Acid Green 3B, GG extra
Blue:	Cotton Blue II, IV, R
	Blue 4830
	China Blue Z 2317
	New Patent Blue B, 4B, GA
	Methylene Blue BB
	Victoria Blue B
Violet:	Crystal Violet P
	Methyl Violet brands
	Acid Violet brands
Brown:	Bismark Brown F, M, R extra
Black:	Nigrosine B conc., LT 12831
	Black 22616 (basic)

Hairs and Bristles.

Before dyeing, the raw material is boiled in a very dilute soda solution; horse hair with 1% soda ash (calculated on the weight of the goods), and bristles with 2%. Only black colours come into consideration, except in the case of horse hair which is also dyed red.

Enter at the boil and dye with an addition of 2% sulphuric acid. The bath exhausts after about 1/2 hour.

255. List of Colours.

Red:	Brilliant Croceine 3B
	Bordeaux G, extra
Black:	Naphtylamine Black 4B
	Black 24331

Note: In order to obtain a deep black with Naphtylamine Black 4B, shade with a little Orange IIB.

Fibre.

As a rule fibre is only dyed black as a substitute for horse hair.

Dye for 1 hour at the boil with 2% Direct Deep Black E extra and 10% Glauber's salt.

For fancy shades Substantive and acid Colours, as well as Basic Colours, may be used.

Lake Colours.

Pigment Colours are used for artistic and decorative work, house painting, the manufacture of wall and fancy paper, calico printing (in so far as it is not carried out with soluble tar colours), book printing and lithography, the manufacture of paper and numerous others articles e. g. book cloth and imitation leather etc.

Whilst tar colours have been found too costly in isolated cases e. g. where an excellent finish can be produced with cheap mineral colours, in other cases they have proved to be the most suitable colouring matter. They meet with an ever increasing demand for wall paper printing, the manufacture of fancy paper and studio requisites, and, in many cases, for paints, especially red.

The properties of the lake colour depend quite as much on the substrate used as on the colour. We cannot give any detailed suggestions on the choice of a substrate. This will always depend upon the price and purpose of the colour which is to be manufactured. The hydrate of alumina which is often used as a substrate is produced as follows:

Solution 1. 6 lbs sulphate of alumina (technically about 18% Al_2O_3),
6 gallons water.

Solution 2. $2^1/_2$ lbs soda ash,
$2^1/_2$ gallons water.

Both solutions must be heated up to 160° Faht., and the second then slowly stirred into the first. After the precipitate has settled, the liquor is poured off. The precipitate is washed by decanting several times, then filtered, and the strength of the dry paste determined. This should amount to about 10% when the filtering is done without the application of pressure.

The hydrate of alumina is washed only when a precipitation of permanent white, when the lake is deposited by chloride of barium, is to be avoided. If the sodium sulphate, which is formed by the reaction between soda

and sulphate of alumina, is not washed off, so much more chloride of barium must be added, when the colour is precipated, as is necessary to deposit the sulphuric acid as barium sulphate. The substrate does not, in this case, consist of pure hydrate of alumina, but also contains permanent white.

The colours suitable for the manufacture of lakes may be grouped, according to the different methods pursued, as follows:

1. Insoluble colours:
   a) in paste form (15—30% pastes);
   b) dry (in pieces or powder);
   c) colours which are produced with the substrate admixed.
2. Soluble colours which are precipitated by metallic salts (barium chloride, calcium chloride, lead acetate etc.)
   a) paste colours which are difficult to dissolve;
   b) colours in powder form, which are easily soluble;
   c) Acid Alizarine Colours.
3. Alizarine Colours in paste form.
4. Basic Colours.

Group 1. **Insoluble Colours.**

a) The colours are mixed with the substrate (barytes, zinc white, alumina etc.), if necessary, with an addition of water, then filtered, dried and ground.

b) The powdered colour, mixed with the dry substrate, must be ground with the combining agent (linseed oil, varnish etc).

c) Paranitraniline Base (or Base HR) is diazotised and the filtered Diazo solution slowly stirred into the Beta Naphtole solution which has been mixed with the substrate.

The colours of this group are insoluble in water. The older products including Paranitraniline Red, though they have the adventage of being absolutely insoluble in water, have the drawback of being more or less soluble in spirit and oil. As oil colours, therefore, they cannot be painted over with white, since they show up through the white, and as printing colours, they cannot be varnished, since they run out into the spirit lacquer. The first of the series insoluble both in oil and spirit is our Helio Fast Red RL. Helio Chrome Yellow GL should also be found sufficiently insoluble in oil and spirit for most practical purposes. These colours are, at the same time, perfectly fast to water,

insoluble in oil and spirit and excellent in fastness to light. Moreover, Helio Fast Red RL is uneffected by heat, so that it may be dried at a high temperature when used together with spirit lacquers.

The above group of colours is very valuable on account of its resistance to chemical action; the different brands are fast both to alkali and acid. Helio Fast Red RL and Helio Chrome Yellow GL are also quite fast to chlorine. Their fastness to acid accounts for their great durability when exposed to atmospheric action. They are so perfectly fast to alkali that even cement does not destroy them. As oil colours, they yield lakes of considerably better covering power than those colours which are soluble in water and precipitated by barium chloride, whilst the alumina lakes which are made from them, are also excellent for glazing. As yet, the group includes only the following few products:

Helio Fast Red RL paste
„ „ „ RL extra paste
„ „ „ RL in lumps
Helio Chrome Yellow GL paste
„ „ „ GL in lumps
Fast Orange paste.

The last mentioned is not very fast to light and is soluble in oil and spirit.

Recipes for lakes from colours of group 1.

Oil colour: 200 lbs. barytes
132 „ Helio Fast Red RL paste
or 66 „ „ „ „ „ extra paste.

The barytes and the colour paste are to be thoroughly mixed with one another, if necessary, with an addition of water. After filtering, dry and grind until the shade of the powder is as bright as possible. When using the extra brand it is advisable before filtering to add a solution of $9^1/_2$—13 ozs. sulphate of alumina per 200 lbs colour paste. By replacing part of the barytes by zinc white, oil colours of somewhat clearer shade and better covering power are obtained.

Colours for printing and lithography.

200 lbs hydrate of alumina paste 1/10
40 „ Helio Fast Red RL paste
or 20 „ „ „ „ „ extra paste.

Such an alumina lake in lumps has an unattractive reddish grey appearance. If a bright lake in lumps is to

be produced on hydrate of alumina, the alumina must be precipated together with the Helio Fast Red paste in very weak solutions, according to the following directions:

Thoroughly mix 2 lbs Helio Fast Red RL paste with 1 lb dry soda ash. When using the extra brand, take 1 lb colour and 1 lb water for 1 lb soda. Stir the mixture, which has got warm, for about further 10 minutes, and dilute with $2^4/_5$ gallons water. Then, whilst stirring well, slowly pour a solution of 2 lbs sulphate of alumina in $5^1/_5$ gallons water into the colour solution or vice versa. After washing and filtering, dry the lake well for an extended time. In this way a product in substantial lumps of a bright red, both on the surface and in section, is obtained.

Recipe for Paranitraniline lakes.

Diazotising. Thoroughly mix 50 lbs Paranitraniline with 14 gallons cold water, then add 180 lbs hydrochloric acid techn. (30° Tw.), and warm up, until, by stirring well, the Paranitraniline is all dissolved. Pour the hot solution into a mixture of 360 lbs ice and 72 gallons water, when the Paranitraniline Base separates out in a very finely divided form. Now add, as quickly as possible, a solution of 28 lbs sodium nitrite in 12 gallons water, and stir well, until, in a short time, the diazotising is completed. The Diazo solution must be filtered so that a flaky by-product, which occurs in small quantities, is separated out.

The diazotising may be done without ice, but in thas case, care must be taken that the water used is kept at cold as possible. The method pursued must then be changed as follows:

50 lbs Paranitraniline is made up into a paste, as carefully as possible, with a solution of 28 lbs sodium nitrite in 4 gallons water. No dry particles of Nitraniline should be visible. A good result depends upon a very thorough mixing of the Nitraniline with the nitrite solution. 120 gallons cold water is now added and afterwards, whilst stirring vigorously, 180 lbs hydrochloric acid (30° Tw.). When the diazotising is completed, the solution must be filtered.

A hot solution must be previously made of 57 lbs 3 oz. Beta Naphtole or Naphtole AR in 50 lbs soda lye (77° Tw.) and 10 gallons water, and this is mixed with another hot solution of 60 lbs soda ash in 600 lbs water. Finally, the substrate, made into a paste with water, is added. Into this mixture, the filtered Diazo solution is very slowly poured, whilst stirring well.

For oil paints use a substrate made of 1000 lbs barytes which has been mixed with 3000 lbs cold water.

For printing and lithography use a substrate consisting of 3000 lbs hydrate of alumina paste 1/10.

Lakes prepared with Beta Naphtole are yellowish red, those prepared with Naphtole AR are bluish. When using Naphtole AR 17 lbs Turkey red oil must be added to the Naphtole solution.

The Nitraniline red lakes possess good fastness to light and very good covering power, but are soluble in oil and spirit.

Base HR. The preparation of Helio Fast Red lakes from this base very closely resembles the preparation of Paranitraniline reds. The coupling and the preparation of the Naphtole solution is the same, except that the Naphtole AR and Turkey red oil must not be used. The diazotising is a little different:

After gradually making 55 lbs Base HR into a good paste with water, add 180 lbs hydrochloric acid (30° Tw.) and, little by little, (in about 10 portions) 28 lbs nitrite, dissolved in 12 gallons water. The diazotising process must be checked by means of potassium ioside starch paper. The diazotising is never fully completed; there always remains a little residue which must be carefully filtered out. For the rest, proceed exactly as in the case of Paranitraniline Red.

Group 2. Soluble colours which are precipitated by metallic salts (chiefly barium chloride).

The Acid Colours (among which there are certain brands specially manufactured for the production of lakes), the Sulphon, Substantive, as well as most of the Mordant Colours, yield metallic salts which dissolve with great difficulty or not at all, so that barium chloride (more rarely calcium chloride or lead acetate) is useful as a precipitant for all these colours, if lakes are to be prepared from them.

As the majority of these barium salts are only soluble to a small (but varying) degree, the lakes formed from the different colours are more or less perfect. Those colours which yield barium salts so soluble that they cannot be precipitated to any great extent, are not suitable for lakes. Lake colours, which precipitate well, generally produce lakes of good fastness to water.

a) Paste colours which are difficult to dissolve.

These colours are so difficult to dissolve that they require a very large amount of water. They are supplied in paste form so that they can be mixed well with the substrate. The formation of the lake is effected by boiling the colour paste, which has been thoroughly mixed with the substrate, with barium chloride,

The colours obtained in this way are remarkable for their good fastness to water, and as oil colours they are generally distinguished by good covering power.

Helio Purpurine 3BL requires 8 oz barium chloride } per 2 lbs
" " 5BL " 6 " " " } paste

The two colours are similar in their properties, are of good fastness to light and very suitable for print colours, but are not quite fast to spirit. They cannot be used as wall paper colours as, in this case, they only yield dull shades. They are well adapted for oil colours, but the lakes must be thoroughly ground after being dried.

b) Easily soluble colours in powder form.

A large number of these colours may be made into useful lakes by precipitating with barium chloride. They are not all satisfactory as regards precipitability and fastness to water and some are only moderately fast to light. These lakes are suitable for fancy coloured paper and wall paper, as well as for printing. As oil colours they are lacking in productiveness.

The colours must be dissolved in hot water, mixed with the substrate and precipitated with barium chloride. They are to be cooled down before filtering. Stirring considerably furthers the complete separation of the lake.

For those colours which easily precipitate, take as much barium chloride as colour to ensure a complete precipitation; for those which do not so easily precipitate, the amount of barium chloride may be slightly increased. The accompanying table suggests suitable quantities of colour and precipitant to be used. The Eosines are generally precipitated with lead salts, often on red lead, in order to serve as imitations of vermillion. Recently, such imitations of vermillion with Eosines have been supplanted more and more by lakes from Helio Fast Red RL. Colour No. 12 in the following table is only adapted for oil colours; Nos. 2, 3, 18 are only suitable for print colours, whilst the others may be used for print colours, fancy paper and wall paper colours.

	fastness to light	100 parts colour require of chloride of barium
1. Quinoline Yellow	moderate	150 parts
2. Fast Light Yellow 3G . .	very good	170 „
3. Fast Light Yellow 2G . .	very good	160 „
4. Sulphon Yellow R conc. .	good	100 „
5. Naphtol Yellow S	good	140 „
6. Paper Yellow GG extra . .	very good	100 „
7. Direct Yellow R extra . .	good	100 „
8. Chrome Yellow R extra . .	moderate	100 „
9. Metanil Yellow conc. . . .	moderate	100 „
10. Mandarine G	moderate	130 „
11. Orange IIB	moderate	130 „
12. Helio Red RM	very good	100 „
13. Ponceau 2RL	moderate	130 „
14. Brilliant Croceine 3B conc. 20722	moderate	130 „
15. Croceine Scarlet 3B	moderate	140 „
16. Croceine Scarlet 7B	moderate	140 „
17. Croceine Scarlet 10B . . .	moderate	140 „
18. Brilliant Helio Purpurine B	moderate	100 „
19. Helio Purpurine 7BL . . .	good	160 „
20. Helio Purpurine 10BL . .	good	100 „
21. Carmoisine B conc. 8810 . .	moderate	100 „
22. Fast Red BT	moderate	100 „
23. Cloth Red BR	moderate	100 „
24. Acid Violet 4B extra . . .	moderate	100 „
25. Gallocyanine	good	100 „
26. Alkali Blue brands	moderate	100 „
27. Night Blue extra greenish .	good	100 „
28. Brilliant Acid Green 6B . .	moderate	130 „
29. Acid Green L	moderate	160 „
30. Acid Green L conc. 21939 .	moderate	160 „
31. Naphtol Green B	very good	170 „
32. Eosine S extra yellowish .	moderate	140 „ } Sugar
33. Eosine S extra bluish . . .	moderate	140 „ } of lead

Recipe for Lakes on pure hydrate of alumina.

Dissolve 1000 parts hydrate of alumina paste 1:10
5 „ Sulphon Yellow R conc. in
250 „ hot water
50 „ chloride of barium solution 1:10.

The hydrate of alumina paste, colour solution and chlorate of barium solution are to be added in this sequence, whilst stirring well.

The lake obtained in this way is a greenish yellow. Stronger lakes of this colour give reddish shades.

Recipe for a Lake on a mixture of hydrate of alumina and permanent white.

Solution 1.	sulphate of alumina tech. (about 18% Al_2O_3)	100 parts
	hot water	1000 „
Solution 2.	soda ash	50 „
	hot water	500 „
Solution 3.	Helio Purpurine 7BL . . .	45 „
	hot water	1000 „
Solution 4.	chloride of barium cryst. . .	175 „
	water	1750 „

Vermillion imitation on red lead, made from Eosine. Mix 1000 parts red lead with water, add 40 parts Eosine extra bluish dissolved in 1000 parts water, and precipitate with 550 parts lead sugar solution 1:10.

Helio Red RM on barytes for oil colours. Prepare a paste from 1000 parts barytes with water, add a solution of 100 parts Helio Red RM and, whilst stirring well, follow with 1000 parts chloride of barium solution 1:10. The dry lake must be well ground. A clear yellowish red is obtained in this way, which is very good in fastness to light.

c) Acid Alizarine Colours.

Alizarine Colours soluble in water are generally convertible into lakes which are excellently fast to light and of good fastness to water, when working (heating) with hydrate of alumina and a solution of chloride of barium. The lakes thus obtained are very well suited for lithographic purposes, especially because they are quite fast to spirit. Some of these colours, when worked with Turkey Red Oil or with Turkey Red Oil and acetate of chrome on hydrate of alumina yield bright lakes, for instance Alizarine Heliotrope R, Coeruleine S, Galleine etc.

1. Alizarine Red PS
2. Alizarine Heliotrope R
3. Galleine paste
4. Helio Fast Violet AL
5. Alizarine Cyanine 3R double paste
6. „ „ „ BBS
7. Helio Fast Blue SL conc.
8. „ „ „ BL conc.

9. Alizarine Cyanine Green E
10. „ „ „ K
11. „ „ „ G extra
12. „ „ „ 3G
13. Coeruleine S

Recipe for print colours.

a) Precipitation with chloride of barium. Mix well 1000 parts hydrate of alumina paste 1:10 with 30 parts Helio Fast Blue BL conc. Add 2000 parts hot water and 300 parts chloride of barium solution 1:10, and boil for 5 minutes.

b) Precipitation with Red Oil.

1000 parts hydrate of alumina paste
30 „ Alizarine Heliotrope R
50 „ Turkey Red Oil
} boil the prepare with 2000 parts water for 10 minutes.

Very clear, green lakes of good fastness to light are obtained by combining Helio Fast Blue BL conc. with Fast Light Yellow 3G.

Group 3. **Alizarine colours in paste.**

The (insoluble) colours are marketed in 20% paste form, and are converted into lakes by continuous boiling with pure hydrate of alumina, the latter serving at the same time as a substrate.

To produce fiery red colours, it is necessary to work with Turkey Red Oil and phosphate of lime.

The lakes produced from this Group are called "Madder Lakes" and are principally used for printing and lithographic work, as well as for artist colours, especially such used in water colour-painting. The madder lakes are exceedingly fast to light, but they are not quite indifferent to acids and alkalies.

1. Alizarine Red XGG paste
2. „ „ SX extra new paste
3. „ „ RVT paste
4. „ „ IB extra paste
5. „ „ II ABB paste
6. Brilliant Alizarine Bordeaux R paste
7. Alizarine Bordeaux B paste
8. „ Cyclamine R paste.

No. 4 gives a bluish shade of madder lake which is mostly required, No. 5 is slightly duller and cheaper. Yellower lakes are obtained with Nos. 2 and 3, (No. 3 is slightly duller than No. 2), whilst No. 1 produces the most yellowish shade.

Recipe for Madder Lakes.

The hydrate of alumina for Alizarine lakes is quite different from that used for lakes from Acid Colours. Firstly, it is necessary to employ more soda, secondly, the alumina must be precipitated at the boil and must be worked at this temperature for another hour, and finally be washed out completely. A good Alizarine lake will be obtained with an alumina prepared as follows:

Solution I. 972 parts sulphate of alumina (tech. 18% Al_2O_3)
10000 „ water
Solution II. 500 parts soda ash
5000 „ water.

Add the hot soda solution slowly to the hot alumina solution whilst stirring, keep for 1 hour near the boil, wash with clean water free from iron, until by repeated decanting a sample of the wash water shows but very little turbidness with chloride of barium solution. The alumina now obtained by filtering may be used at once for making Alizarine Lake. The weight of the paste filtered into a bag amounts to about 7000 parts. Add to the alumina paste a solution of 144 parts chloride of lime calc., chemically pure, in 500 parts water, and follow, whilst stirring well, with a solution of 84 parts phosphate of ammonia (pure neutral salt) in 500 parts water. Then stir into it 200 parts ammonia-Turkey Red oil, which is previously dissolved in a little water, and finally add 1000 parts Alizarine Red 1 B extra (20% paste).

Boil this preparation either for 6 hours in an open vessel, when the evaporated water must be replenished, or treat for 1 hour in the autoclave with about 55 lbs pressure.

Alizarine Cyclamine is affected by metallic influences, thus also by copper, and for this reason should not be steamed in the autoclave, but lead vessels may be used without risk.

Group 4. **Basic Colours.**

Basic Colours may be precipitated with tannin or tannin and tartar emetic. Besides, the dyestuff acids of Acid Colours form insoluble compounds with dyestuff bases. As is well known, when pouring solutions of an Acid Colour and a Basic Colour together, they precipitate one another. This mutual precipitation is often resorted to in the preparation of lake colours; lakes from colours of group 2 as mentioned under b are, for instance, brightened with small quantities of Basic Colours, whilst Ponceau lakes are frequently darkened with solutions of New Magenta to produce claret shades.

Lakes from Basic Colours are used for wall paper and fancy paper colours, in many cases combined with Acid Colours, as well as for print colours when shades of special brilliancy are required.

Basic Colours are also largely employed for making "Distempers". In such cases, green earth is used as a substrate for either green or blue, white fixing clay or kaoline for other shades. When the solutions of Basic Colours are stirred together with any of these substrates, they become fast to lime and water. The greens on green earth are very good in fastness to light.

1. New Magenta
2. Saffranine FF extra
3. Rhodamine B extra
4. „ G extra
5. Auramine O
6. Brilliant Green cryst.
7. China Green cryst.
8. Turquoise Blue GL extra
9. „ „ G
10. „ „ BB
11. Methylene Blue BB
12. Victoria Blue B
13. Methyl Violet brands.

Recipes for lakes from Basic Colours.

Tannin Lakes:

1000 parts hydrate of alumina paste 1:10
5 „ Turquoise Blue GL extra
1000 „ water
100 „ tannin solution 1:20.

Claret for wall paper:

500 parts barytes
1000 „ sulphate of alumina solution 1:10
500 „ soda solution 1:10
40 „ Ponceau 2RL
5 „ New Magenta
1500 „ chloride of barium solution 1:10

Distemper colour:

1000 parts green earth, stirred into a paste with water
10 parts Brilliant Green cryst.
1000 „ water

After a short stirring the colour solution will be fixed

Conversion of Thermometer Degrees.

To convert

C	into	R,	multiply	by	4	and	divide	by	5			
C	,,	F,	,,	,,	9	,,	,,	,,	5,	then	add	32.
R	,,	C,	,,	,,	5	,,	,,	,,	4.			
R	,,	F,	,,	,,	9	,,	,,	,,	4,	then	add	32.
F	,,	R,	subtract		32,	multiply		,,	4,	and	divide	by 9
F	,,	C,	,,		32,	,,		,,	5,	,,	,,	,, 9.

Comparison between the Centigrade, Réaumur and Fahrenheit scales.

Cent.	Rmr.	Faht.	Cent.	Rmr.	Faht.
100	80,0	212,0	66	52,8	150,8
99	79,2	210,2	65	52,0	149,0
98	78,4	208,4	64	51,2	147,2
97	77,6	206,6	63	50,4	145,4
96	76,8	204,8	62	49,6	143,6
95	76,0	203,0	61	48,8	141,8
94	75,2	201,2	60	48,0	140,0
93	74,4	199,4	59	47,2	138,2
92	73,6	197,6	58	46,4	136,4
91	72,8	195,8	57	45,6	134,6
90	72,0	194,0	56	44,8	132,8
89	71,2	192,2	55	44,0	131,0
88	70,4	190,4	54	43,2	129,2
87	69,6	188,6	53	42,4	127,4
86	68,8	186,8	52	41,6	125,6
85	68,0	185,0	51	40,8	123,8
84	67,2	183,2	50	40,0	122,0
83	66,4	181,4	49	39,2	120,2
82	65,6	179,6	48	38,4	118,4
81	64,8	177,8	47	37,6	116,6
80	64,0	176,0	46	36,8	114,8
79	63,2	174,2	45	36,0	113,0
78	62,4	172,4	44	35,2	111,2
77	61,6	170,6	43	34,4	109,4
76	60,8	168,8	42	33,6	107,6
75	60,0	167,0	41	32,8	105,8
74	59,2	165,2	40	32,0	104,0
73	58,4	163,4	39	31,2	102,2
72	57,6	161,6	38	30,4	100,4
71	56,8	159,8	37	29,6	98,6
70	56,0	158,0	36	28,8	96,8
69	55,2	156,2	35	28,0	95,0
68	54,4	154,4	34	27,2	93,2
67	53,6	152,6	33	26,4	91,4

Comparison between the Centigrade, Réaumur and Fahrenheit scales.

(Concluded.)

Cent.	Rmr.	Faht.	Cent.	Rmr.	Faht.
32	25,6	89,6	15	12,0	59,0
31	24,8	87,8	14	11,2	57,2
30	24,0	86,0	13	10,4	55,4
29	23,2	84,2	12	9,6	53,6
28	22,4	82,4	11	8,8	51,8
27	21,6	80,6	10	8,0	50,0
26	20,8	78,8	9	7,2	48,2
25	20,0	77,0	8	6,4	46,4
24	19,2	75,2	7	5,6	44,6
23	18,4	73,4	6	4,8	42,8
22	17,6	71,6	5	4,0	41,0
21	16,8	69,8	4	3,2	39,2
20	16,0	68,0	3	2,4	37,4
19	15,2	66,2	2	1,6	35,6
18	14,4	64,4	1	0,8	33,8
17	13,6	62,6	0	0,0	32,0
16	12,8	60,8			

Table of percentages of caustic soda at 60° Faht. according to Lunge.

Specific gravity	Beaumé	Twaddle	Per cent NaOH
1,007	1	1,4	0,61
1,014	2	2,8	1,20
1,022	3	4,4	2,00
1,029	4	5,8	2,71
1,036	5	7,2	3,35
1,045	6	9,0	4,00
1,052	7	10,4	4,64
1,060	8	12,0	5,29
1,067	9	13,4	5,87
1,075	10	15,0	6,55
1,083	11	16,6	7,31

Table of percentages of caustic soda at 60° Faht. according to Lunge.

(Concluded.)

Specific gravity	Beaumé	Twaddle	Per cent NaOH
1,091	12	18,2	8,00
1,100	13	20,0	8,68
1,108	14	21,6	9,42
1,116	15	23,2	10,06
1,125	16	25,0	10,97
1,134	17	26,8	11,84
1,142	18	28,4	12,64
1,152	19	30,4	13,55
1,162	20	32,4	14,37
1,171	21	34,2	15,13
1,180	22	36,0	15,91
1,190	23	38,0	16,77
1,200	24	40,0	17,67
1,210	25	42,0	18,58
1,220	26	44,0	19,58
1,231	27	46,2	20,59
1,241	28	48,2	21,42
1,252	29	50,4	22,64
1,263	30	52,6	23,67
1,274	31	54,8	24,81
1,285	32	57,0	25,80
1,297	33	59,4	26,83
1,308	34	61,6	27,80
1,320	35	64,0	28,83
1,332	36	66,4	29,93
1,345	37	69,0	31,22
1,357	38	71,4	32,47
1,370	39	74,0	33,69
1,383	40	76,6	34,96
1,397	41	79,4	36,25
1,410	42	82,0	37,47
1,424	43	84,8	38,80
1,438	44	87,6	39,99
1,453	45	90,6	41,41
1,468	46	93,6	42,83
1,483	47	96,6	44,38
1,498	48	99,6	46,15
1,514	49	102,8	47,60
1,530	50	106,0	49,02

Table of percentages of aqueous nitric acid at 60° Faht. according to Kolb.

Beaumé	Specific gravity	Per cent NO_3H	Beaumé	Specific gravity	Per cent NO_3H
0	1,000	0,2	26	1,220	35,5
1	1,007	1,5	27	1,231	37,0
2	1,014	2,6	28	1,242	38,6
3	1,022	4,0	29	1,252	40,2
4	1,029	5,1	30	1,261	41,5
5	1,036	6,3	31	1,275	43,5
6	1,044	7,6	32	1,286	45,0
7	1,052	9,0	33	1,298	47,1
8	1,060	10,2	34	1,309	48,6
9	1,067	11,4	35	1,321	50,7
10	1,075	12,7	36	1,334	52,9
11	1,083	14,0	37	1,346	55,0
12	1,091	15,3	38	1,359	57,3
13	1,100	16,8	39	1,372	59,6
14	1,108	18,0	40	1,384	61,7
15	1,116	19,4	41	1,398	64,5
16	1,125	20,8	42	1,412	67,5
17	1,134	22,2	43	1,426	70,6
18	1,143	23,6	44	1,440	74,4
19	1,152	24,9	45	1,454	78,4
20	1,162	26,3	46	1,470	83,0
21	1,171	27,8	47	1,485	87,1
22	1,180	29,2	48	1,501	92,6
23	1,190	30,7	49	1,516	96,0
24	1,200	32,1	49,5	1,524	98,0
25	1,210	33,8	49,9	1,530	100,0

Table of percentages of aqueous sulphurous acid at 60° Faht. (Scott).

Specific gravity	Per cent SO_2	Specific gravity	Per cent SO_2
1,0028	0,5	1,0302	5,5
1,0056	1,0	1,0328	6,0
1,0085	1,5	1,0353	6,5
1,0113	2,0	1,0377	7,0
1,0141	2,5	1,0401	7,5
1,0168	3,0	1,0426	8,0
1,0194	3,5	1,0450	8,5
1,0221	4,0	1,0474	9,0
1,0248	4,5	1,0497	9,5
1,0275	5,0	1,0520	10,0

Table of percentages of hydrochloric acid according to Kolb.

Specific gravity	Beaumé	Per cent H Cl
1,000	0	0,1
1,007	1	1,5
1,014	2	2,9
1,022	3	4,5
1,029	4	5,8
1,036	5	7,3
1,044	6	8,9
1,052	7	10,4
1,060	8	12,0
1,067	9	13,4
1,075	10	15,0
1,083	11	16,5
1,091	12	18,1
1.100	13	19,9
1.108	14	21,5
1,116	15	23,1
1,125	16	24,8
1,134	17	26,6
1,143	18	28,4
1,152	19	30,2
1,157	19,5	31,2
1,161	20	32,0
1,166	20,5	33,0
1,171	21	33,9
1,175	21,5	34,7
1,180	22	35,7
1,185	22,5	36,8
1,190	23	37,9
1,195	23,5	39,0
1,199	24	39,8
1,205	24,5	41,2
1,210	25	42,4
1,212	25,5	42,9

Table of percentages of acetic acid at 60° Faht. according to Oudemanns.

Specific gravity	Per cent $C_2H_4O_2$	Specific gravity	Per cent $C_2H_4O_2$	Specific gravity	Per cent $C_2H_4O_2$
0,9992	0	1,0459	34	1,0725	68
1,0007	1	1,0470	35	1,0729	69
1,0022	2	1,0481	36	1,0733	70
1,0037	3	1,0492	37	1,0737	71
1,0052	4	1,0502	38	1,0740	72
1,0067	5	1,0513	39	1,0742	73
1,0083	6	1,0523	40	1,0744	74
1,0098	7	1,0533	41	1,0746	75
1,0113	8	1,0543	42	1,0747	76
1,0127	9	1,0552	43	1,0748	77
1,0142	10	1,0562	44	1,0748	78
1,0157	11	1,0571	45	1,0748	79
1,0171	12	1,0580	46	1,0748	80
1,0185	13	1,0589	47	1,0747	81
1,0200	14	1,0597	48	1,0746	82
1,0214	15	1,0607	49	1,0744	83
1,0228	16	1,0615	50	1,0742	84
1,0242	17	1,0623	51	1,0739	85
1,0256	18	1,0631	52	1,0736	86
1,0270	19	1,0638	53	1,0731	87
1,0284	20	1,0646	54	1,0726	88
1,0298	21	1,0653	55	1,0720	89
1,0311	22	1,0660	56	1,0713	90
1,0324	23	1,0666	57	1,0705	91
1,0337	24	1,0673	58	1,0696	92
1,0350	25	1,0679	59	1,0686	93
1,0363	26	1,0685	60	1,0674	94
1,0375	27	1,0691	61	1,0660	95
1,0388	28	1,0697	62	1,0644	96
1,0400	29	1,0702	63	1,0625	97
1,0412	30	1,0707	64	1,0604	98
1,0424	31	1,0712	65	1,0580	99
1,0436	32	1,0717	66	1,0553	100
1,0447	33	1,0721	67		

Note: Specific gravity higher than 1.0553 is equivalent to two solutions of varying strength. In order to ascertain whether acetic acid exceeding the maximum density (78%) is present, it is only necessary to add a little water. If the specific gravity increases, the acid was stronger than 78%, but if it decreases, the acid was weaker.

Table of percentages of aqueous ammonia at 57° Faht. according to Carius.

Specific gravity	Per cent NH_3	Specific gravity	Per cent NH_3
0,9959	1	0,9283	19
0,9936	1,5	0,9267	19,5
0,9915	2	0,9251	20
0,9894	2,5	0,9236	20,5
0,9873	3	0,9221	21
0,9851	3,5	0,9206	21,5
0,9831	4	0,9191	22
0,9811	4,5	0,9177	22,5
0,9790	5	0,9162	23
0,9769	5,5	0,9147	23,5
0,9749	6	0,9133	24
0,9729	6,5	0,9119	24,5
0,9709	7	0,9106	25
0,9689	7,5	0,9092	25,5
0,9670	8	0,9078	26
0,9655	8,5	0,9065	26,5
0,9631	9	0,9052	27
0,9612	9,5	0,9038	27,5
0,9593	10	0,9026	28
0,9574	10,5	0,9013	28,5
0,9556	11	0,9001	29
0,9538	11,5	0,8988	29,5
0,9520	12	0,8976	30
0,9501	12,5	0,8964	30,5
0,9484	13	0,8953	31
0,9466	13,5	0,8940	31,5
0,9449	14	0,8929	32
0,9431	14,5	0,8918	32,5
0,9414	15	0,8907	33
0,9396	15,5	0,8896	33,5
0,9380	16	0,8885	34
0,9363	16,5	0,8874	34,5
0,9347	17	0,8864	35
0,9330	17,5	0,8854	35,5
0,9314	18	0,8844	36
0,9299	18,5		

Table of percentages of sulphuric acid at 60° Faht. according to Kolb.

Specific gravity	Beaumé	Per cent SO_4H_2	Specific gravity	Beaumé	Per cent SO_4H_2
1,000	0	0,9	1,308	34	40,2
1,007	1	1,9	1,320	35	41,6
1,014	2	2,8	1,332	36	43,0
1,022	3	3,8	1,345	37	44,4
1,029	4	4,8	1,357	38	45,5
1,037	5	5,8	1,370	39	46,9
1,045	6	6,8	1,383	40	48,3
1,052	7	7,8	1,397	41	49,8
1,060	8	8,8	1,410	42	51,2
1,067	9	9,8	1,424	43	52,6
1,075	10	10,8	1,438	44	54,0
1,083	11	11,9	1,453	45	55,4
1,091	12	13,0	1,468	46	56,9
1,100	13	14,1	1,483	47	58,3
1,108	14	15,2	1,498	48	59,6
1,116	15	16,2	1,514	49	61,0
1,125	16	17,3	1,530	50	62,5
1,134	17	18,5	1,540	51	64,0
1,142	18	19,6	1,563	52	65,5
1,152	19	20,8	1,580	53	67,0
1,162	20	22,2	1,597	54	68,6
1,171	21	23,3	1,615	55	70,0
1,180	22	24,5	1,634	56	71,6
1,190	23	25,8	1,652	57	73,2
1,200	24	27,1	1,671	58	74,7
1,210	25	28,4	1,691	59	76,4
1,220	26	29,6	1,711	60	78,1
1,231	27	31,0	1,732	61	79,9
1,241	28	32,2	1,753	62	81,7
1,252	29	33,4	1,774	63	84,1
1,263	30	34,7	1,796	64	86,5
1,274	31	36,0	1,819	65	89,7
1,285	32	37,4	1,842	66	100,0
1,297	33	38,8			

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